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ATLAS RESIN PROPPANTS LLC
Process Emission Tests
at

Taylor, WI
March 17, 18 & 19, 2009
P.O. #TW2818

Prepared by:

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Atlas Resin Proppants - Process Emission Test

I. Introduction and Summary

Badger Laboratories & Engineering Co., Inc. (BL&E) was retained by Atlas Resin Proppants to perform emission testing on the discharge of three separate sources located off County Road P, north of Taylor, WI in Jackson County. Testing was performed to determine the emission rate of Particulate, Volatile Organic Compounds (VOC) and Phenol from the discharge of a sand resin coating process (P150). A wet scrubber is used for emission control on this source. Testing was also performed to determine the Particulate emission rates from the baghouses discharging to S20 and S120.

Emission tests were conducted March 17, 18 & 19, 2009 by Bruce Lamers and Matt Vissers of BL&E, (phone No. 920-729-1100). The testing was performed to demonstrate compliance with limitations listed in Wisconsin Department of Natural Resources (WDNR) Air Pollution Control Construction Permit No. 07-JAJ-042. Mr. Tom Ponty from the WDNR was present to witness the testing on March 19, 2009. Testing was performed following U.S. EPA and NIOSH Methods. Mr. Robbie Sage and Ms. Erica Marczak are the Atlas Resin Proppants contacts, (phone No. 715-662-2200). Summaries of the test results are shown below. A more detailed breakdown of the results is contained on the next page and in the Appendix.

Emission Results

Source, Id.	Parameter	Results	Limitation
S20	Particulate	0.15 lbs./hr	1.0 lbs./hr
S120	Particulate	0.29 lbs./hr	1.0 lbs./hr
S150	Particulate VOC, as Propane	1.14 lbs./hr 5.16 lbs./hr	1.50 lbs./hr 11.0 lbs./hr
	Phenol or VOC	19.3% DE 27.5% DE	54.5% DE 64% DE

DE = Destruction Efficiency

Particulate Emission Results

S20 - 03/17/09

<u>Test Run</u>	<u>Volumetric Flow Rate, dscfm</u>	<u>Isokinetic Ratio, %</u>	<u>gr/dscf</u>	<u>Particulate lbs/hr</u>
1	8,571	101.0	0.0028	0.204
2	8,490	100.9	0.0017	0.122
3	8,394	101.2	0.0016	0.115
Average Limitation	8,485		0.0020	0.15
		90-110		1.0

Particulate Emission Results

S120 - 03/18/09

<u>Test Run</u>	<u>Volumetric Flow Rate, dscfm</u>	<u>Isokinetic Ratio, %</u>	<u>gr/dscf</u>	<u>Particulate lbs/hr</u>
1	11,149	100.3	0.0018	0.175
2	11,624	100.8	0.0034	0.345
3	11,917	100.8	0.0035	0.356
Average Limitation	11,563		0.0029	0.29
		90-110		1.0

Particulate Emission Results

S150 - 03/19/09

<u>Test Run</u>	<u>Volumetric Flow Rate, dscfm</u>	<u>Isokinetic Ratio, %</u>	<u>gr/dscf</u>	<u>Particulate lbs/hr</u>
1	4,209	99.1	0.025	0.916
2	4,248	99.2	0.036	1.311
3	4,189	99.4	0.033	1.197
Average Limitation	4,215		0.032	1.14
		90-110		1.5

	<u>VOC & Phenol</u>			
	S150 - 03/19/09			
	Run #1	Run #2	Run #3	Average
Inlet VOC, lbs/hr	6.68	6.03	9.44	7.38
Outlet VOC, lbs/hr	5.15	5.17	5.16	5.16
Limitation, lbs/hr				11.0
VOC, Des. Eff. %	22.9%	14.3%	45.3%	27.5%
Limitation, Des. Eff. %				64%
Inlet Phenol, lbs/hr	1.57	0.11	1.27	0.98
Outlet Phenol, lbs/hr	1.57	0.10	0.61	0.76
Phenol, Des. Eff. %	0.3%	5.9%	51.6%	19.3%
Limitation, Des. Eff. %				54.5%

$$\text{Destruction Efficiency} = \frac{\text{Inlet Rate} - \text{Outlet Rate}}{\text{Inlet Rate}} * 100$$

The VOC limitation is either 11.0 lbs/hr or Des. Eff. % of 64%.. The Phenol limitation is either Phenol Des. Eff. % of 54.5% or VOC Des. Eff. % of 64%.

II. Comments

The testing on March 17, 18 & 19, 2009 was performed without any sampling problems that we were aware of except as noted below. We believe the test results presented accurately indicate the emission rate of the source during each test period. All leak checks and calibrations were within method tolerances.

The testing on S120 was halted half way into run number two because there was a mixer plug up and the process was stopped. The testing was resumed after the problem was resolved.

As can be seen from the Phenol results, they are all over the place. We really don't have an explanation for this, other than moisture potentially causing a problem. The VOC results, especially on the outlet, were very consistent over the three runs.

The inlet VOC testing was only performed on the large duct from the mixer. There was not enough room to sample the combined flow after the small duct combined with the large duct. Based on results from testing the other mixer some years ago, and some preliminary readings this time, we felt that the small duct would have little or no effect on the total inlet VOC loading. Even if one assumed the inlet VOC concentration to be the same on both ducts as it was on the large duct, it would only raise the VOC Des. Eff. % to 43%. During preliminary testing the VOC concentration on the small duct was less than 10 ppm which on a mass basis is less than 0.1 lbs/hr.

III. Process Description

The testing was performed on the discharge of three separate sources.

Sand Resin Coating Process Discharge (S150)

Heated sand and flake resins, with a small amount of additives are mixed in the Batch Mixer. An aqueous hexamethylenetetramine solution is added to the Batch Mixer to cross-link the melted flake resin and begins cooling the coated sand. Each Batch Mix is 2,500 pounds. There are 11 batches per hour. During the emission test the process was operated at this rate. Each batch is discharge into a Continuous Mixer (P152) which is designed to keep the process flowing as discrete particles until the product has cooled. The Continuous Mixer converts the batch process into a continuous process. There is a wet scrubber (C150) that is used to control emission from this source. The wet scrubber also controls emissions from (P153).

Process data during the testing was collected by Atlas Resin Proppants personnel and is contained in the Appendix. The process data included the pressure drop across the wet scrubber, liquor flow rate to scrubber and pH of wet scrubber absorbing fluid.

Tower A (old tower) (S20)

The testing was performed on the discharge of the baghouse (C20) at the stack (S20). The baghouse collects particulate matter in the form of silica and resin dust. It is collected from various points (P13, P16-17, P21-29, P41-49 & P71). The dust is generated while running a resin coated sand plant which processes approximately 11 batches per hour at 2,500 lbs. per batch.

Tower B (new tower) (S120)

The testing was performed on the discharge of the baghouse (C120) at the stack (S120). The baghouse collects particulate matter in the form of silica and resin dust. It is collected from various points (P113, P116-117, P121-129, P141-149 & P171). The dust is generated while running a resin coated sand plant which processes approximately 11 batches per hour at 2,500 lbs. per batch.

The process throughput rates supplied by Atlas resin Proppants personnel are shown below.

S20	3/17/09	31,049 lbs/hr
S120	3/18/09	31,745 lbs/hr
S150	3/19/09	30,995 lbs/hr

IV. Stack Testing and Analytical Procedures

The procedures for sampling, testing, instrumentation and analysis as described by the U.S. EPA were followed. The EPA reference methods used in the testing program are summarized below.

Method 1: Sample and Velocity Traverse Locations

The outlet sampling site for both S20 and S120 lies in a straight section of 28" inside diameter stacks. The sampling ports are 2.5 diameters downstream and 1.5 diameters upstream from any flow disturbances. Twenty-four points were sampled, twelve on each traverse. Each point was sampled for 2.5 minutes for a total test run time of 60 minutes. The location of the traverse points is shown below:

Location of Traverse Points From Stack Wall

<u>Traverse Point No.</u>	<u>Percent from Wall</u>	<u>Inches from Wall</u>
1	2.1	1.0
2	6.7	2.6
3	11.8	4.7
4	17.7	7.0
5	25.0	9.9
6	35.6	14.1
7	64.4	25.4
8	75.0	29.6
9	82.3	32.5
10	88.2	34.8
11	93.3	36.8
12	97.9	38.5

The outlet sampling site for S150 lies in a straight section of 19.5" inside diameter stacks. The sampling ports are more than 8.0 diameters downstream and more than 2.0 diameters upstream from any flow disturbances. Twelve points were sampled, six on each traverse. Each point was sampled for 5 minutes for a total test run time of 60 minutes. The location of the traverse points is shown below:

Location of Traverse Points From Stack Wall

<u>Traverse Point No.</u>	<u>Percent from Wall</u>	<u>Inches from Wall</u>
1	4.4	0.8
2	14.6	2.8
3	29.6	5.8
4	70.4	13.7
5	85.4	16.6
6	95.6	18.6

The sampling site for the two inlet locations lies in a 16 and 8 inch diameter ducts. The sampling ports for both ducts are more than 2.0 diameters downstream and more than 1.0 diameters upstream from any flow disturbances. The velocity traverse was performed at sixteen points, eight on each traverse, on the large inlet duct.

Method 2: Stack gas velocity and Volumetric Flow Rate

For each tests run on the outlet a velocity traverse was made with a calibrated "S" Pitot tube having a co-efficient of 0.840. The velocity head was read on an inclined manometer to the nearest 0.01 inches of water. Temperature was measured with a chromel-alumel thermocouple. Sampling site barometric pressure was verified from National Weather Service data.

For each tests run on the large inlet duct a velocity traverse was made with a standard Pitot tube having a co-efficient of 0.99. The flow rate of the small inlet duct was calculated based on the difference of the outlet and large inlet duct.

Method 3: Component Gas Analysis

No gas sample was analyzed for Carbon Dioxide (CO_2), Oxygen (O_2), and Nitrogen (N_2). The concentrations of these gases were assumed to be at ambient conditions.

Method 4: Moisture Content

The moisture content of the outlet stack gas was determined by condensing in three impingers in an ice bath and absorbing any remaining moisture in a fourth impinger containing silica gel. The moisture content of the large inlet duct was determined using the wet bulb/dry bulb technique.

Method 5 & 202: Particulate Emission

Particulate material is withdrawn isokinetically from the stack and collected on a glass fiber filter maintained in the temperature range of 223° F. - 273° F. The sample gas stream is dried as in Method 4 above. The sample gas is then passed through a metering system which measures both the cumulative volume of gas sampled and the instantaneous sampling rate. Method 202 Methylene Chloride extraction is performed on the impinger contents to determine condensable Particulate.

Sampling Train

A schematic of the sampling train used in this method is shown in Figure 5-1 (See Page #11). The sampling train consists of the following components:

Stainless steel, buttonhook-type nozzle.
Teflon gasket.
Titanium probe Liner.
Glass filter holder.
Electrically heated enclosed sample box.
Ice-water bath.
Greenburg-Smith impinger.
Greenburg-Smith impinger.
Modified Greenburg-Smith impinger.
Modified Greenburg-Smith impinger.
Check valve.
Vacuum gauge.
Main valve.
Leak-free vacuum pump.
Bypass valve.
Dry gas meter.
Calibrated orifice.
Dual manometer.
Type "S" Pitot tube.

A more detailed description of the sampling train components follows:

1. Probe Nozzle: Stainless steel with sharp, tapered leading edge. A 0.275 inch diameter (as measured on site with a caliper) nozzle was used in all the tests.
2. Probe Liner: Titanium with a heating system to maintain a gas temperature at the exit during sampling of 223° F. to 273° F.
3. Pitot Tube: A Type "S" Pitot tube attached to the probe allowed constant monitoring of the stack gas velocity. The Pitot tube has a co-efficient of 0.840. Delta P was read from an inclined manometer.
4. Differential Pressure Gauge: An inclined manometer with a range of 0 - 8 inches water was used to obtain Delta H.
5. Filter Holder: Borosilicate glass, with a Teflon filter support and gasket.
6. Filter Heating System: Thermostat controlled electrical resistance type heater capable of maintaining a temperature of 223°F. - 273°F. around the filter holder.

7. Impingers: Four Pyrex glass impingers connected in series with a leak-free ground glass fitting. The first and second impinger were a Greenburg-Smith design with a standard tip. The third and fourth impingers were Greenburg-Smith design with a modified (straight) tip. A thermometer was in place to measure the temperature at the outlet of the fourth impinger.
8. Metering System: The vacuum gauge, leak-free pump, thermometer, temperature compensated dry gas meter, and related equipment is shown in Figure 5-1. The sampler is a Millennium Instruments- Mill 5 Stack sampler.

Sampling Procedures

Prior to testing, the sampling train is cleaned and set up as follows:

A three-inch diameter glass fiber filter was dried in a desiccator for more than 24 hours and weighed on an analytical balance to the nearest 0.1 milligrams (mg.). Two hundred fifty milliliters (ml.) of distilled water were placed in the first three impingers. Two hundred grams dry silica gel (indicating) was placed in the fourth impinger. The sampling train was assembled as shown in Figure 5-1 (Page #11). Based on the preliminary velocity and temperature traverse, an appropriate nozzle size was selected to provide an adequate sampling rate.

After assembly, the sampling train was leak-checked at the inlet to the nozzle at 15 inches mercury vacuum. If a leak rate of greater than 0.02 ft.³/min. was observed, the system was checked and leaks corrected. The leak-check procedure was repeated until the leakage rate was less than 0.02 ft.³/min.

Approximately fifteen minutes before the start of the test, the probe and filter box heaters were turned on and allowed to warm up to sampling temperatures. Ice was placed around the impingers. At the start of a test run, the dry gas meter reading was recorded on the data sheet, the probe was placed in the stack at the first sampling point, and the velocity pressure was read. Using an isokinetic flow rate calculator, the desired orifice meter pressure was determined. The sample pump was then turned on and the time was recorded. The main and By-pass valves were immediately adjusted to give the desired sampling rate. For each point, the following data was recorded: Traverse Point Number, Sampling Time, Stack Temperature, Velocity Head, Orifice Meter Reading, Dry Gas Meter Volume, Meter Temperature, Box Temperature, and Pump Vacuum. Near the end of the sampling time (approximately 10 seconds remaining), the nozzle was moved to the next point and exactly at the start of the next sampling period, the dry gas meter volume was recorded. The point by point sampling procedures were then repeated until the test run was completed. While moving between ports, the pump was turned off. At the completion of the test run, the pump was turned off, the dry gas meter volume recorded, and the probe was removed from the stack. The sampling train was leak-checked from the sample nozzle at the highest vacuum pulled during the test to verify the leak-free integrity of the system.

Sample Recovery

Sample recovery of the probe and probe nozzle was accomplished near the sampling site. The inner surfaces of each were rinsed with acetone along with cleaning by a brush until no visible particulate was present in the rinse. The impingers and filter holder contents were recovered at a clean area on site. The contents of the first three impingers were measured volumetrically and placed in a clean container. The silica gel in the fourth impinger was transferred to a clean, dry container and weighed. The filter was carefully transferred to a petri dish. Any filter material which stuck to the gasket was scraped loose and transferred to the petri dish. The upstream portion of the filter holder was washed with acetone. The wash from the filter holder was combined with the washes from the probe and probe nozzle. The container was labeled to identify the test run.

Sample Analysis

In the laboratory, the filter and any loose particulate were placed in a desiccator for more than 24 hours. The material was then weighed on an analytical balance to the nearest 0.1 mg.

The volume of the upstream acetone washes was measured and transferred to a tared beaker. The acetone was evaporated at room temperature. After desiccation, the beaker was reweighed. Simultaneously, a 100 ml. acetone blank was evaporated and the residue weight was determined. The net residue weight of the sample washes has been adjusted for the acetone blank.

The water collected from the first three impingers was measured to the nearest ml. All the sample exposed glassware was rinsed with methylene chloride and placed in a separate dry, clean container. The water collected was extracted with the methylene chloride rinse and two additional portions of methylene chloride. The extracts were evaporated in a tarred beaker at 20°C.

A 200 ml. portion of the remaining water was used for the inorganic fraction. The total particulate collected is the summation of the acetone probe wash weight gain plus the filter weight gain, plus the water extract weight gain plus the water residue weight gain.

The silica gel from each run was weighed to the nearest 0.1 gr. The weight gain of the silica gel was added to the volume of the liquid water collected in the first three impingers to obtain the total amount of water collected.

EPA Method 25A: VOC

This method applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes and/or aromatic hydrocarbons. A gas sample was extracted from each source through a heated Teflon sample line to the flame ionization analyzer. The sample lines were heated to 300 degrees Fahrenheit.

The flame ionization analyzer used during the tests was a VIG Industries Model 20/2 dual channel heated hydrocarbon analyzer. The Model 20/2 is a highly sensitive FID that provides a direct

reading of total organic vapor concentrations with linear ranges of 0-100, 1,000 and 10,000 ppm by volume. The heated pump and detector were heated to 300 degrees Fahrenheit.

The instrument was calibrated using zero air and propane in EPA certified standard of 942 ppm. The calibrations were performed before and after each test run. The mid and low level gases were introduced to the analyzer using a Millennium Instruments, Inc. Model 2002 Cal Gas Diluter that meets the requirements of EPA Method 205. The span and zero air calibration gases are mixed in the Cal Gas Diluter to pre set dilutions using calibrated orifices. Simultaneous sampling on the inlet and outlet was conducted for three one-hour test runs. Analyzer readings were logged on a Dataq Instruments electronic data recorder that averaged the readings every five second. A copy of the charts is contained in the Appendix.

NIOSH Method 2546: Phenol Determination

The sampling was performed using XAD-7 tubes. The sampling on the outlet was performed at approximately 100 cc/minute. A dry gas meter was used to determine the total sample volume. The sampling on the large inlet ducts was performed at 40 cc/minute and 200 cc/minute on the small inlet duct. The sampling rate was checked before and after each tests run with a calibrated rotameter. Upon completion of the testing the samples were shipped to the NATLSCO Risk & safety Industrial Hygiene Laboratory for analysis. The Laboratory Analysis Report is contained in the Appendix.

Data Handling and Calculations

All mathematical calculations were made according to accepted techniques using U.S. EPA equations. A laptop computer was used to store, calculate and generate the final emission results. Standard conditions of 29.92 inches mercury pressure and 68°F. temperature were used. Field calculations were rechecked, and the final results for each test run are presented in detail in the Appendix.

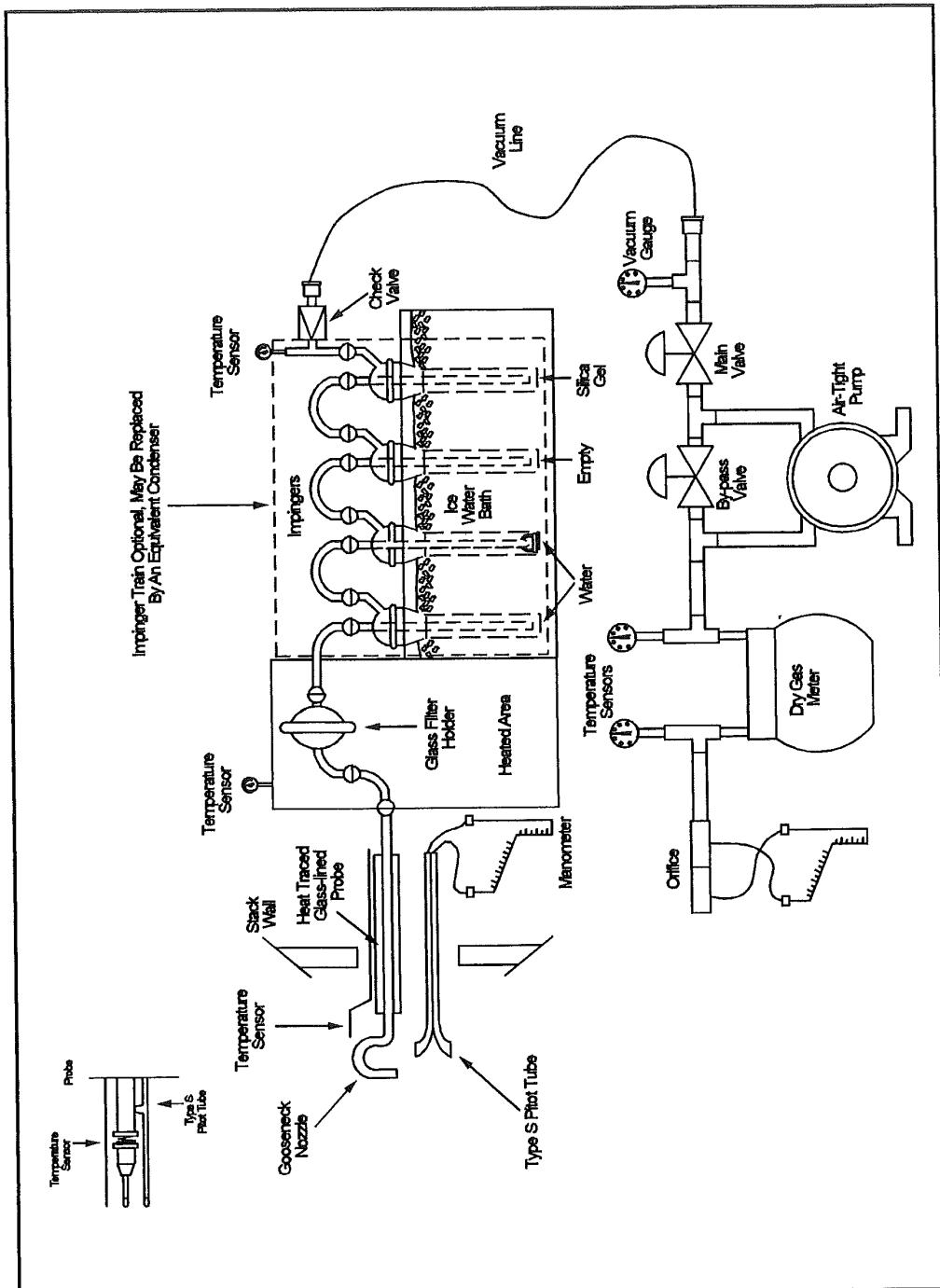


Figure 5-1. Particulate Sampling Train.

Appendix

Particulate Laboratory Data

Source: (S20)-South Baghouse
Analysis Date: 3/29/2009
Test Run: 1-3

Run: No.	1	2	3	Blank
Filter: No.	1	2	3	4
Final Weight, mg.	360.8	355.7	360.1	376.2
Tare Weight, mg.	360.0	354.7	359.4	376.2
Weight Gain, mg.	0.8	1.0	0.7	0.0
Acetone Probe Wash:				
Final Weight, mg.	55831.4	52802.2	54319.3	53560.7
Tare Weight, mg.	55827.3	52799.1	54315.1	53560.0
Blank Correction, mg.	-0.2	-0.1	-0.2	
Volume, ml.	33	20	24	100
Weight Gain, mg.	3.9	3.0	4.0	0.7
				0.007 mg/ml
Impinger Water Extracts:				
(CH ₂ Cl ₂)				
Final Weight, mg.	50707.3	51916.1	51025.1	57743.2
Tare Weight, mg.	50707.0	51914.8	51024.4	57742.9
Blank Correction, mg.	-0.3	-0.3	-0.3	
Weight Gain, mg.	0.0	1.0	0.4	0.3
Impinger Water Residue:				
200 ml aliquot				
Final Weight, mg.	94398.0	96682.6	96961.0	93930.3
Tare Weight, mg.	94395.4	96681.9	96960.7	93929.8
Blank Correction, mg.	-0.5	-0.5	-0.5	
Volume, ml.	405	410	455	260
Weight Gain, mg.	4.3	0.4	0.0	0.5
Total Particulate, mg.	9.0	5.4	5.1	

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S20)-South Baghouse	Barometric Pressure	28.85	Meter H@	1.73
Date	03/17/09	Assumed Moisture,%	2	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	1	Probe Heater Temp	223-273	Kref=	47.74
Stack Dia.& Area	28	Filter #	1	Kb =	0.01143
Operator	bfl	Sample Box #	1	Point Time	2.5

0:02:30

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrl Delta P	Orifice Delta H	Box Temp	Pump Vacuum
11:02	1	2.5	140	63	62	513.750	0.630	0.7937	3.28	223-273	6
11:04:30	2	2.5	142	63	62	16.42	0.670	0.8185	3.47	223-273	
11:07:00	3	2.5	143	63	62	19.07	0.750	0.8660	3.88	223-273	
11:09:30	4	2.5	145	65	62	21.93	0.730	0.8544	3.78	223-273	
11:12:00	5	2.5	146	66	63	24.68	0.680	0.8246	3.53	223-273	
11:14:30	6	2.5	146	68	63	27.38	0.550	0.7416	2.86	223-273	5
11:17:00	7	2.5	144	70	63	29.78	0.340	0.5831	1.78	223-273	
11:19:30	8	2.5	142	70	64	31.68	0.270	0.5196	1.42	223-273	3
11:22:00	9	2.5	139	70	64	33.37	0.220	0.4690	1.17	223-273	
11:24:30	10	2.5	137	71	64	34.96	0.190	0.4359	1.01	223-273	
11:27:00	11	2.5	136	72	64	36.36	0.180	0.4243	0.96	223-273	
11:29:30	12	2.5	136	72	64	37.76	0.170	0.4123	0.91	223-273	
11:34:00	13	2.5	140	72	65	39.10	0.340	0.5831	1.81	223-273	
11:36:30	14	2.5	141	74	66	41.05	0.410	0.6403	2.19	223-273	
11:39:00	15	2.5	143	76	66	43.21	0.440	0.6633	2.35	223-273	
11:41:30	16	2.5	144	78	67	45.39	0.500	0.7071	2.68	223-273	4
11:44:00	17	2.5	146	79	68	47.73	0.500	0.7071	2.68	223-273	
11:46:30	18	2.5	147	81	68	50.08	0.510	0.7141	2.74	223-273	
11:49:00	19	2.5	148	82	69	52.44	0.530	0.7280	2.86	223-273	
11:51:30	20	2.5	148	83	69	54.77	0.520	0.7211	2.81	223-273	
11:54:00	21	2.5	146	84	70	57.20	0.490	0.7000	2.67	223-273	
11:56:30	22	2.5	142	85	70	59.49	0.430	0.6557	2.36	223-273	
11:59:00	23	2.5	140	85	71	61.70	0.380	0.6164	2.10	223-273	
12:01:30	24	2.5	139	85	71	63.78	0.370	0.6083	2.04	223-273	
12:04:00	25					565.880					
Total		60				52.13					
Average			142.5	74.0	65.7		0.4500	0.6578	2.39		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			258	214
Initial			250	200
Net H2O			8	14
Total H2O Collected, ml			22	

Orsats			
Bag #	CO2	O2	N2
1	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	529.9	Ts=	602.5	Md=	28.84	Acfm=	10355
Pm=	29.03	Ps=	28.84	Ms=	28.62	dscfm=	8571
Vmstd=	50.111	Bwo=	0.020	Vs=	40.361	I=	101.0

Comments:

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S20)-South Baghouse	Barometric Pressure	28.85	Meter H@	1.73
Date	03/17/09	Assumed Moisture, %	2	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	2	Probe Heater Temp	223-273	Kref=	47.740
Stack Dia.& Area	28 4.28	Filter #	2	Kb =	0.0114303
Operator	bfl	Sample Box #	2	Point Time	2.5

0:02:30

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
12:18	1	2.5	146	76	74	566.150	0.660	0.8124	3.56	223-273	5
12:20:30	2	2.5	148	80	74	68.85	0.710	0.8426	3.85	223-273	6
12:23:00	3	2.5	150	83	75	71.66	0.720	0.8485	3.92	223-273	
12:25:30	4	2.5	151	85	75	74.49	0.710	0.8426	3.87	223-273	
12:28:00	5	2.5	152	87	75	77.34	0.620	0.7874	3.39	223-273	
12:30:30	6	2.5	152	89	76	79.99	0.580	0.7616	3.19	223-273	
12:33:00	7	2.5	149	90	76	82.54	0.320	0.5657	1.77	223-273	3
12:35:30	8	2.5	147	89	76	84.44	0.260	0.5099	1.44	223-273	
12:38:00	9	2.5	144	88	76	86.17	0.210	0.4583	1.17	223-273	
12:40:30	10	2.5	141	88	76	87.69	0.190	0.4359	1.06	223-273	
12:43:00	11	2.5	141	88	77	89.16	0.170	0.4123	0.95	223-273	
12:45:30	12	2.5	140	88	77	90.57	0.160	0.4000	0.90	223-273	
12:50:00	13	2.5	143	88	77	91.90	0.370	0.6083	2.06	223-273	
12:52:30	14	2.5	145	89	78	93.93	0.410	0.6403	2.29	223-273	4
12:55:00	15	2.5	147	90	79	96.13	0.440	0.6633	2.46	223-273	
12:57:30	16	2.5	150	91	79	98.38	0.500	0.7071	2.78	223-273	
13:00:00	17	2.5	150	93	80	600.75	0.510	0.7141	2.85	223-273	
13:02:30	18	2.5	153	95	80	3.23	0.510	0.7141	2.85	223-273	
13:05:00	19	2.5	152	96	81	5.63	0.530	0.7280	2.98	223-273	5
13:07:30	20	2.5	152	96	81	8.05	0.510	0.7141	2.87	223-273	
13:10:00	21	2.5	148	96	82	10.47	0.490	0.7000	2.78	223-273	
13:12:30	22	2.5	145	97	82	12.85	0.400	0.6325	2.28	223-273	
13:15:00	23	2.5	143	96	83	14.98	0.370	0.6083	2.12	223-273	
13:17:30	24	2.5	141	96	83	17.08	0.340	0.5831	1.95	223-273	
13:20:00	25					619.082					
	Total	60				52.932					
	Average		147.1	89.8	78.0		0.4454	0.6538	2.47		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			256	215
Initial			250	200
Net H2O			6	15
Total H2O Collected, ml			21	

Orsats			
Bag #	CO2	O2	N2
2	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	543.9	Ts=	607.1	Md=	28.84	Acfm=	10329
Pm=	29.03	Ps=	28.84	Ms=	28.62	dscfm=	8490
Vmstd=	49.582	Bwo=	0.020	Vs=	40.259	I=	100.9

Comments:

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S20)-South Baghouse	Barometric Pressure	28.85	Meter H@	1.73
Date	03/17/09	Assumed Moisture, %	2	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	3	Probe Heater Temp	223-273	Kref=	47.740
Stack Dia.& Area	28	Filter #	3	Kb =	0.0114303
Operator	bfl	Sample Box #	3	Point Time	2.5

0:02:30

Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Dry Gas Meter			Velocity Delta P	Head Sqrl Delta P	Orifice Delta H	Box Temp	Pump Vacuum
				Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3					
13:31	1	2.5	152	85	84	619.350	0.670	0.8185	3.71	223-273	4
13:33:30	2	2.5	154	90	84	22.12	0.700	0.8367	3.90	223-273	5
13:36:00	3	2.5	155	92	84	24.97	0.700	0.8367	3.91	223-273	
13:38:30	4	2.5	156	94	84	27.85	0.670	0.8185	3.75	223-273	
13:41:00	5	2.5	156	96	84	30.53	0.600	0.7746	3.37	223-273	
13:43:30	6	2.5	156	96	84	33.16	0.550	0.7416	3.09	223-273	
13:46:00	7	2.5	154	97	85	35.62	0.330	0.5745	1.87	223-273	
13:48:30	8	2.5	150	97	85	37.75	0.260	0.5099	1.48	223-273	3
13:51:00	9	2.5	148	96	85	39.44	0.220	0.4690	1.25	223-273	
13:53:30	10	2.5	144	95	85	41.04	0.190	0.4359	1.09	223-273	
13:56:00	11	2.5	143	95	85	42.49	0.170	0.4123	0.97	223-273	
13:58:30	12	2.5	141	95	85	43.88	0.160	0.4000	0.92	223-273	
14:03:00	13	2.5	146	95	86	45.22	0.360	0.6000	2.06	223-273	
14:05:30	14	2.5	149	95	86	47.32	0.400	0.6325	2.28	223-273	
14:08:00	15	2.5	150	96	86	49.50	0.420	0.6481	2.39	223-273	
14:10:30	16	2.5	151	97	87	51.74	0.480	0.6928	2.74	223-273	4
14:13:00	17	2.5	152	98	87	54.07	0.490	0.7000	2.79	223-273	
14:15:30	18	2.5	152	99	87	56.43	0.500	0.7071	2.86	223-273	
14:18:00	19	2.5	153	100	87	58.80	0.520	0.7211	2.97	223-273	
14:20:30	20	2.5	152	101	88	61.28	0.510	0.7141	2.93	223-273	
14:23:00	21	2.5	149	101	88	63.75	0.490	0.7000	2.83	223-273	
14:25:30	22	2.5	146	101	88	66.15	0.420	0.6481	2.44	223-273	
14:28:00	23	2.5	143	101	88	68.38	0.360	0.6000	2.10	223-273	
14:30:30	24	2.5	141	101	88	70.46	0.350	0.5916	2.05	223-273	
14:33:00	25					672.521					
		Total	60			53.171					
	Average			149.7	96.4	85.8		0.4383	0.6493	2.49	

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			260	214
Initial			250	200
Net H2O			10	14
Total H2O Collected, ml			24	

Orsats			
Bag #	CO2	O2	N2
3	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm= 551.1	Ts= 609.7	Md= 28.84	Acfm= 10286
Pm= 29.03	Ps= 28.84	Ms= 28.59	dscfm= 8394
Vmstd= 49.155	Bwo= 0.022	Vs= 40.093	I= 101.2

Comments:

Location:	(S20)-South Baghouse			
Date:	03/17/09			
Time:	11:02	12:18	13:31	
	12:04	13:20	14:33	
Test Run	1	2	3	Average

STACK GAS DATA:

Temperature:	142.5	147.1	149.7	146.4
Velocity, ft/sec.	40.361	40.259	40.093	40.237
Gas Volume, acfm	10,355	10,329	10,286	10,323
Gas Volume, scfm (wet)	8,748	8,660	8,587	8,665
Gas Volume, scfm (dry)	8,571	8,490	8,394	8,485
Moisture, %	2.0	2.0	2.2	2.1
Carbon Dioxide, % (dry)	0.0	0.0	0.0	0.0
Oxygen, % (dry)	20.9	20.9	20.9	20.9
Nitrogen, % (dry)	79.1	79.1	79.1	79.1
Molecular Weight, (dry)	28.84	28.84	28.84	28.84
Molecular Weight, (wet)	28.62	28.62	28.59	28.61

SAMPLING DATA:

Total Time, min.	60	60	60	
Volume, dscf	50.111	49.582	49.155	
Isokinetic Ratio, %	101.0	100.9	101.2	

PARTICULATE EMISSION RATES:

Fronthalf Particulate, mg	4.7	5.4	5.1	5.1
Emission Rate, Fronthalf lbs/hr.	0.1064	0.1223	0.1152	0.1146
Total Particulate Collected, mg	9.0	5.4	5.1	6.5
Concentration, grains/dscf	0.00277	0.00168	0.00160	0.00201
Concentration, lbs/dscf	3.9602E-07	2.4015E-07	2.2878E-07	2.883E-07
Emission Rate, Total lbs/hr.	0.2036	0.1223	0.1152	0.1471
Emission Rate, lb/1000 lb Stack Gas	0.0052	0.0032	0.0030	0.0038

Sample Calculations, Run #1

Static Pressure, "H2O=	-0.1	Nozzle Diameter=	0.275
Barometric Pressure, "hg=	28.85	Nozzle Area, sq. ft.=	0.00041
Meter h Coeff=	1.73	Absolute Stack Temp, R=	602.5
Y Factor=	0.9944	Absolute Meter Temp, R=	529.9
Dry Gas Meter Volume, Cu. Ft.=	52.13	Ave sqrt delta p=	0.6578
Water Collected, (Vlc), mls=	22	Stack Area, sq. ft.=	4.28
Absolute Stack Pressure, "Hg=	28.84	Pitot Tube Coeff., Cp=	0.84
Absolute Meter Pressure, " Hg=	29.03	Sampling Time, Min.=	60
Percent Oxygen=	20.9	Particulate, (Mn),mg=	9.0
Percent Carbon Dioxide=	0.0		
Percent Nitrogen=	79.1		

Volume of Sample at Standard Conditions, Dry Basis

$$17.647 * Y * Vm * Pm / Tm = Vmstd$$

$$17.647 \quad 0.9944 \quad 52.13 \quad 29.03 \quad 529.9 \quad Vmstd = \underline{50.111}$$

Volume of Water Vapor in Sample at Standard Conditions

$$.04707 * Vlc = Vwstd$$

$$.04707 \quad 22 \quad Vwstd = \underline{1.036}$$

Proportion of Water Vapor in Gas Stream

$$Vwstd / (Vmstd + Vwstd) = Bwo$$

$$1.036 \quad 50.111 \quad 1.036 \quad Bwo = \underline{0.020}$$

Concentration of Particulate Matter, Dry Basis

$$Mn * .0154 / Vmstd = C's$$

$$9.0 \quad 0.0154 \quad 50.111 \quad C's = \underline{0.002766}$$

$$Mn * 2.205E-06 / Vmstd = Cs$$

$$9.0 \quad 2.205E-06 \quad 50.110547 \quad Cs = \underline{3.960E-07}$$

Dry Molecular Weight of Stack Gas

$$.44 * %CO2 + .32 * %O2 + .28 * %N2 = Md$$

$$0.44 \quad 0.0 \quad 0.32 \quad 20.9 \quad 0.28 \quad 79.1 \quad Md = \underline{28.836}$$

Molecular Weight of Stack Gas, Wet Basis

$$Md * (1-Bwo) + 18 * Bwo = Ms$$

$$28.836 \quad 0.980 \quad 18 \quad 0.020 \quad Ms = \underline{28.617}$$

Stack Gas Velocity, fps

$$85.49 * Ave sqrt p * Cp * SQRT(Ts) / Ps / Ms = Vs$$

$$85.49 \quad 0.658 \quad 0.84 \quad 602.5 \quad 28.84 \quad 28.617 \quad Vs = \underline{40.361}$$

Volumetric Flow Rate, dscfm

$$63529 * (1-Bwo) * Vs * Stk Area * Ps / Ts = Qs$$

$$63529 \quad 0.980 \quad 40.361 \quad 4.28 \quad 28.84 \quad 602.5 \quad Qs = \underline{514,242}$$

Emission Rate, lbs/hr

$$Qs * Cs = E.R.$$

$$514,242 \quad 3.960E-07 \quad E.R. = \underline{0.203652}$$

Percent of Isokinetic Sampling

$$1.6667 * (.00267 * Vlc + Y * Vm / Tm * Pm) * Ts / Time / Vs / Ps / An = I$$

$$1.6667 \quad 0.00267 \quad 22 \quad 0.9944 \quad 52.13 \quad 529.9 \quad 29.03 \quad 602.5 \quad 60 \quad 40.361 \quad 28.84 \quad 0.000412 \quad I = \underline{101.0}$$

Emission Testing Comment Sheet					
Date:	3/17/09	Date:	3/18/09	Cp=	.37
Site	14th floor	Y=	4.44	Nozzle=	.275
Source	Boiler	Delta H=	1.73		
28" D	2185 - 1.7				
1.0	Leak Check Before	<0.05 cfm@ 15 "hg			
1.9	Start DGM Vol	513.750			pilot tube OK
3.2	Start Time	11:02			sample C = 3" H2O
5.0	Stop Time	12:02			
7.0	Stop DGM Vol	565.880			
10.0	Leak Check After	<0.05 cfm@ 10 "hg			
12.0			11:00	4.25	H2O
24.0			11:10	4.23	
23.0	CO2 %	5.40	11:30	4.23	
24.7	O2 %	19.70	11:40	4.23	
26.1			12:00	4.23	
27.0	Impingers (1-3)	258			
	Dessicant	214			
Leak Check Before	<0.05 cfm@ 15 "hg				
Start DGM Vol	514.6150				
Start Time	12:18				
Stop Time	13:20				
Stop DGM Vol	619.082				
Leak Check After	<0.05 cfm@ 10 "hg				
			12:15	4.25	
			13:00	4.25	
CO2 %			13:15	4.25	
O2 %			13:30	4.25	
Impingers (1-3)	256		13:45	4.25	
Dessicant	215				
Leak Check Before	<0.05 cfm@ 15 "hg				
Start DGM Vol	442.350				
Start Time	13:32				
Stop Time	14:33				
Stop DGM Vol	672.521				
Leak Check After	<0.05 cfm@ 10 "hg		13:30	4.25	
			14:00	4.25	
CO2 %			14:30	4.25	
O2 %			14:45	4.25	
Impingers (1-3)	260				
Dessicant	214				

Particulate Laboratory Data

Source: S120-North Baghouse
Analysis Date: 3/29/2009
Test Run: 1-3

Run: No.	1	2	3	Blank
Filter: No.	11	12	12	14
Final Weight, mg.	370.0	350.0	370.7	370.0
Tare Weight, mg.	370.5	350.2	371.4	370.2
Weight Gain, mg.	0.0	0.0	0.0	-0.2
Acetone Probe Wash:				
Final Weight, mg.	56906.9	49832.0	51051.3	53745.9
Tare Weight, mg.	56903.7	49828.6	51048.4	53745.8
Blank Correction, mg.	0.0	0.0	0.0	
Volume, ml.	27	33	33	100
Weight Gain, mg.	3.2	3.4	2.9	0.1 0.001 mg/ml
Impinger Water Extracts: (CH ₂ Cl ₂)				
Final Weight, mg.	49550.6	49644.8	51623.1	52315.1
Tare Weight, mg.	49549.3	49643.8	51621.8	52315.5
Blank Correction, mg.	0.4	0.4	0.4	
Weight Gain, mg.	1.7	1.4	1.7	-0.4
Impinger Water Residue: 200 ml aliquot				
Final Weight, mg.	109556.7	108096.5	113517.4	96091.5
Tare Weight, mg.	109556.3	108093.0	113513.0	96092.5
Blank Correction, mg.	1.0	1.0	1.0	
Volume, ml.	395	460	410	250
Weight Gain, mg.	2.8	10.4	11.1	-1.0
Total Particulate, mg.	7.7	15.2	15.7	

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S120)-North Baghouse	Barometric Pressure	29.20	Meter H@	1.73
Date	03/18/09	Assumed Moisture, %	1	Y Factor	0.9944
Ambient Temp	35	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	1	Probe Heater Temp	223-273	Kref=	47.74
Stack Dia.& Area	28	Filter #	11	Kb =	0.01129
Operator	bfl	Sample Box #	1	Point Time	2.5

0:02:30

Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Dry Gas Meter			Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
				Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3					
8:52	1	2.5	115	46	46	676.100	0.440	0.6633	2.21	223-273	5
8:54:30	2	2.5	117	46	45	78.20	0.500	0.7071	2.50	223-273	
8:57:00	3	2.5	119	49	45	80.48	0.570	0.7550	2.86	223-273	6
8:59:30	4	2.5	121	49	45	82.93	0.670	0.8185	3.35	223-273	
9:02:00	5	2.5	123	51	45	85.51	0.740	0.8602	3.70	223-273	7
9:04:30	6	2.5	124	54	46	88.25	0.830	0.9110	4.18	223-273	
9:07:00	7	2.5	124	55	46	91.12	0.800	0.8944	4.03	223-273	
9:09:30	8	2.5	123	58	47	94.00	0.790	0.8888	4.02	223-273	
9:12:00	9	2.5	123	59	48	96.81	0.760	0.8718	3.88	223-273	
9:14:30	10	2.5	118	61	48	99.62	0.680	0.8246	3.52	223-273	
9:17:00	11	2.5	116	62	49	702.28	0.550	0.7416	2.87	223-273	
9:19:30	12	2.5	116	63	49	4.74	0.530	0.7280	2.77	223-273	
9:24:00	13	2.5	116	63	50	7.08	0.660	0.8124	3.45	223-273	6
9:26:30	14	2.5	117	64	51	9.72	0.720	0.8485	3.77	223-273	
9:29:00	15	2.5	120	65	51	12.45	0.760	0.8718	3.97	223-273	7
9:31:30	16	2.5	125	68	52	15.31	0.880	0.9381	4.59	223-273	8
9:34:00	17	2.5	125	70	53	18.35	0.950	0.9747	4.99	223-273	
9:36:30	18	2.5	125	70	54	21.52	0.940	0.9695	4.95	223-273	9
9:39:00	19	2.5	126	72	55	24.77	0.820	0.9055	4.33	223-273	
9:41:30	20	2.5	124	72	56	27.76	0.780	0.8832	4.14	223-273	
9:44:00	21	2.5	123	73	56	30.64	0.710	0.8426	3.78	223-273	
9:46:30	22	2.5	120	74	57	33.44	0.610	0.7810	3.28	223-273	
9:49:00	23	2.5	118	74	58	36.00	0.520	0.7211	2.81	223-273	
9:51:30	24	2.5	118	74	58	38.36	0.500	0.7071	2.70	223-273	
9:54:00	25					740.755					
						64.655					
Total		60									
Average			120.7	62.2	50.4		0.6963	0.8300	3.61		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			256	212
Initial			250	200
Net H2O			6	12
Total H2O Collected, ml			18	

Orsats			
Bag #	CO2	O2	N2
1	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	516.3	Ts=	580.7	Md=	28.84	Acfm=	12732
Pm=	29.47	Ps=	29.19	Ms=	28.70	dscfm=	11149
Vmstd=	64.752	Bwo=	0.013	Vs=	49.624	I=	100.3

Comments:

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S120)-North Baghouse	Barometric Pressure	29.20	Meter H@	1.73
Date	03/18/09	Assumed Moisture, %	1	Y Factor	0.9944
Ambient Temp	35	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	2	Probe Heater Temp	223-273	Kref=	47.740
Stack Dia.& Area	28	Filter #	12	Kb =	0.0112947
Operator	bfl	Sample Box #	2	Point Time	2.5

0:02:30

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqr Delta P	Orifice Delta H	Box Temp	Pump Vacuum
10:07	1	2.5	120	60	60	741.000	0.440	0.6633	2.32	223-273	5
10:09:30	2	2.5	121	66	60	43.23	0.500	0.7071	2.66	223-273	
10:12:00	3	2.5	124	69	61	45.55	0.580	0.7616	3.09	223-273	
10:14:30	4	2.5	125	71	61	48.01	0.690	0.8307	3.69	223-273	7
10:17:00	5	2.5	127	74	61	50.74	0.760	0.8718	4.07	223-273	8
10:19:30	6	2.5	127	76	62	53.63	0.860	0.9274	4.63	223-273	9
10:22:00	7	2.5	128	77	63	56.69	0.800	0.8944	4.32	223-273	
10:24:30	8	2.5	128	78	63	59.68	0.770	0.8775	4.16	223-273	
10:27:00	9	2.5	126	79	64	62.59	0.760	0.8718	4.14	223-273	
10:29:30	10	2.5	124	80	64	65.48	0.690	0.8307	3.78	223-273	
10:32:00	11	2.5	121	80	65	68.26	0.580	0.7616	3.20	223-273	
10:34:30	12	2.5	119	81	65	70.84	0.520	0.7211	2.88	223-273	
14:39:00	13	2.5	103	58	58	73.20	0.720	0.8485	3.88	223-273	7
14:41:30	14	2.5	105	58	58	75.97	0.790	0.8888	4.24	223-273	8
14:44:00	15	2.5	108	60	58	78.88	0.890	0.9434	4.77	223-273	9
14:46:30	16	2.5	110	62	58	82.00	0.970	0.9849	5.20	223-273	
14:49:00	17	2.5	113	63	58	85.25	1.000	1.0000	5.34	223-273	10
14:51:30	18	2.5	115	66	59	88.56	1.050	1.0247	5.63	223-273	
14:54:00	19	2.5	117	67	59	92.00	1.000	1.0000	5.35	223-273	
14:56:30	20	2.5	118	69	60	95.42	0.960	0.9798	5.16	223-273	
14:59:00	21	2.5	116	72	61	98.66	0.800	0.8944	4.35	223-273	
15:01:30	22	2.5	116	72	61	801.62	0.720	0.8485	3.91	223-273	
15:04:00	23	2.5	115	73	61	4.38	0.680	0.8246	3.71	223-273	
15:06:30	24	2.5	115	75	62	7.10	0.670	0.8185	3.68	223-273	
15:09:00	25					809.842					
	Total	60				68.842					
	Average		118.4	70.3	60.9		0.7583	0.8656	4.09		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			258	215
Initial			250	200
Net H2O			8	15
Total H2O Collected, ml			23	

Orsats			
Bag #	CO2	O2	N2
2	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	525.6	Ts=	578.4	Md=	28.84	Acfm=	13259
Pm=	29.50	Ps=	29.19	Ms=	28.67	dscfm=	11624
Vmstd=	67.807	Bwo=	0.016	Vs=	51.679	I=	100.8

Comments:

Company	Atlas Resin	Static Pressure	-0.1	Cp	0.84
Location	(S120)-North Baghouse	Barometric Pressure	29.15	Meter H@	1.73
Date	03/18/09	Assumed Moisture, %	1	Y Factor	0.9944
Ambient Temp	50	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	3	Probe Heater Temp	223-273	Kref=	47.740
Stack Dia.& Area	28 4.28	Filter #	13	Kb =	0.0112947
Operator	bfl	Sample Box #	3	Point Time	2.5

0:02:30

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
15:20	1	2.5	117	65	65	810.100	0.490	0.7000	2.64	223-273	4
15:22:30	2	2.5	120	70	64	12.46	0.550	0.7416	2.97	223-273	
15:25:00	3	2.5	122	73	64	14.91	0.640	0.8000	3.47	223-273	
15:27:30	4	2.5	124	77	65	17.60	0.730	0.8544	3.98	223-273	5
15:30:00	5	2.5	126	81	67	20.39	0.850	0.9220	4.67	223-273	
15:32:30	6	2.5	127	82	67	23.50	0.910	0.9539	5.00	223-273	6
15:35:00	7	2.5	128	83	67	26.70	0.920	0.9592	5.06	223-273	
15:37:30	8	2.5	127	84	68	29.93	0.880	0.9381	4.86	223-273	
15:40:00	9	2.5	125	85	68	33.08	0.820	0.9055	4.56	223-273	
15:42:30	10	2.5	123	85	69	36.13	0.780	0.8832	4.36	223-273	
15:45:00	11	2.5	122	86	70	39.11	0.760	0.8718	4.27	223-273	
15:47:30	12	2.5	121	87	70	42.06	0.690	0.8307	3.89	223-273	
15:52:00	13	2.5	120	85	71	44.84	0.820	0.9055	4.62	223-273	
15:54:30	14	2.5	122	86	72	47.88	0.860	0.9274	4.85	223-273	
15:57:00	15	2.5	125	87	72	51.02	1.000	1.0000	5.62	223-273	6
15:59:30	16	2.5	126	89	73	54.38	1.050	1.0247	5.92	223-273	7
16:02:00	17	2.5	127	90	74	57.86	1.100	1.0488	6.22	223-273	
16:04:30	18	2.5	127	91	74	61.45	1.050	1.0247	5.95	223-273	
16:07:00	19	2.5	126	91	75	64.94	0.920	0.9592	5.23	223-273	
16:09:30	20	2.5	124	91	75	68.22	0.890	0.9434	5.08	223-273	
16:12:00	21	2.5	123	92	76	71.44	0.780	0.8832	4.47	223-273	
16:14:30	22	2.5	121	92	76	74.42	0.680	0.8246	3.91	223-273	
16:17:00	23	2.5	119	92	76	77.26	0.600	0.7746	3.46	223-273	
16:19:30	24	2.5	119	92	76	79.93	0.510	0.7141	2.94	223-273	
16:22:00	25					882.360					
	Total	60				72.26					
	Average		123.4	84.8	70.6		0.8033	0.8913	4.50		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			256	216
Initial			250	200
Net H2O			6	16
Total H2O Collected, ml			22	

Orsats			
Bag #	CO2	O2	N2
3	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	537.7	Ts=	583.4	Md=	28.84	Acfm=	13720
Prm=	29.48	Ps=	29.14	Ms=	28.68	dscfm=	11917
Vmstd=	69.522	Bwo=	0.015	Vs=	53.475	I=	100.8

Comments:

Location:	(S120)-North Baghouse			
Date:	03/18/09			
Time:	8:52	10:07	15:20	
	9:54	15:09	16:22	
Test Run	1	2	3	Average

STACK GAS DATA:

Temperature:	120.7	118.4	123.4	120.8
Velocity, ft/sec.	49.624	51.679	53.475	51.592
Gas Volume, acfm	12,732	13,259	13,720	13,237
Gas Volume, scfm (wet)	11,295	11,810	12,094	11,733
Gas Volume, scfm (dry)	11,149	11,624	11,917	11,563
Moisture, %	1.3	1.6	1.5	1.4
Carbon Dioxide, % (dry)	0.0	0.0	0.0	0.0
Oxygen, % (dry)	20.9	20.9	20.9	20.9
Nitrogen, % (dry)	79.1	79.1	79.1	79.1
Molecular Weight, (dry)	28.84	28.84	28.84	28.84
Molecular Weight, (wet)	28.70	28.67	28.68	28.68

SAMPLING DATA:

Total Time, min.	60	60	60	
Volume, dscf	64.752	67.807	69.522	
Isokinetic Ratio, %	100.3	100.8	100.8	

PARTICULATE EMISSION RATES:

Fronthalf Particulate, mg	3.2	3.4	2.9	3.2
Emission Rate, Fronthalf lbs/hr.	0.0729	0.0771	0.0658	0.0719
Total Particulate Collected, mg	7.7	15.2	15.7	12.9
Concentration, grains/dscf	0.00183	0.00345	0.00348	0.00292
Concentration, lbs/dscf	2.6221E-07	4.9428E-07	4.9795E-07	4.181E-07
Emission Rate, Total lbs/hr.	0.1754	0.3447	0.3560	0.2921
Emission Rate, lb/1000 lb Stack Gas	0.0035	0.0065	0.0066	0.0055

Sample Calculations, Run #1

Static Pressure, "H2O=	-0.1	Nozzle Diameter=	0.275
Barometric Pressure, "hg=	29.20	Nozzle Area, sq. ft.=	0.00041
Meter h Coeff=	1.73	Absolute Stack Temp, R=	580.7
Y Factor=	0.9944	Absolute Meter Temp, R=	516.3
Dry Gas Meter Volume, Cu. Ft.=	64.655	Ave sqrt delta p=	0.8300
Water Collected, (Vlc), mls=	18	Stack Area, sq. ft.=	4.28
Absolute Stack Pressure, "Hg=	29.19	Pitot Tube Coeff., Cp=	0.84
Absolute Meter Pressure, " Hg=	29.47	Sampling Time, Min.=	60
Percent Oxygen=	20.9	Particulate, (Mn),mg=	7.7
Percent Carbon Dioxide=	0.0		
Percent Nitrogen=	79.1		

Volume of Sample at Standard Conditions, Dry Basis

$$17.647 * Y * Vm / Pm / Tm = Vmstd$$

$$17.647 \quad 0.9944 \quad 64.655 \quad 29.47 \quad 516.3 \quad Vmstd = \underline{64.752}$$

Volume of Water Vapor in Sample at Standard Conditions

$$.04707 * Vlc = Vwstd$$

$$0.04707 \quad 18 \quad Vwstd = \underline{0.847}$$

Proportion of Water Vapor in Gas Stream

$$Vwstd / (Vmstd + Vwstd) = Bwo$$

$$0.847 \quad 64.752 \quad 0.847 \quad Bwo = \underline{0.013}$$

Concentration of Particulate Matter, Dry Basis

$$Mn * .0154 / Vmstd = C's$$

$$7.7 \quad 0.0154 \quad 64.752 \quad C's = \underline{0.001831}$$

$$Mn * 2.205E-06 / Vmstd = Cs$$

$$7.7 \quad 2.205E-06 \quad 64.75194 \quad Cs = \underline{2.622E-07}$$

Dry Molecular Weight of Stack Gas

$$.44 * \%CO2 + .32 * \%O2 + .28 * \%N2 = Md$$

$$0.44 \quad 0.0 \quad 0.32 \quad 20.9 \quad 0.28 \quad 79.1 \quad Md = \underline{28.836}$$

Molecular Weight of Stack Gas, Wet Basis

$$Md * (1-Bwo) + 18 * Bwo = Ms$$

$$28.836 \quad 0.987 \quad 18 \quad 0.013 \quad Ms = \underline{28.696}$$

Stack Gas Velocity, fps

$$85.49 * Ave sqrt p * Cp * SQRT(Ts) / Ps / Ms = Vs$$

$$85.49 \quad 0.830 \quad 0.84 \quad 580.7 \quad 29.19 \quad 28.696 \quad Vs = \underline{49.624}$$

Volumetric Flow Rate, dscfm

$$63529 * (1-Bwo) * Vs * Stk Area * Ps / Ts = Qs$$

$$63529 \quad 0.987 \quad 49.624 \quad 4.28 \quad 29.19 \quad 580.7 \quad Qs = \underline{668.970}$$

Emission Rate, lbs/hr

$$Qs * Cs = E.R.$$

$$668.970 \quad 2.622E-07 \quad E.R. = \underline{0.175409}$$

Percent of Isokinetic Sampling

$$1.6667 * (.00267 * Vlc + Y * Vm / Tm * Pm) * Ts / 60 = I$$

$$1.6667 \quad 0.00267 \quad 18 \quad 0.9944 \quad 64.655 \quad 516.3 \quad 29.47 \quad 580.7 \quad 60 \quad 49.624 \quad 29.19 \quad 0.000412 \quad I = \underline{100.3}$$

Emission Testing Comment Sheet					
Date:	3/16/04				
Site	4100	Date:	4/21/04	Cp=	3.97
Source	EZ Regen	Y=	4144	Nozzle=	2.25
BP	30.70	Delta H=	1.13		
Leak Check Before	4005 cfm@ 15 "hg				
Start DGM Vol	676.100				
Start Time	10:52				
Stop Time	9:54				
Stop DGM Vol	743.755				
Leak Check After	4005 cfm@ 10 "hg				
CO2 %	10.1				
O2 %	20.1				
Impingers (1-3)	256				
Dessicant	212				
Leak Check Before	4005 cfm@ 15 "hg				
Start DGM Vol	741.000				
Start Time	10:07				
Stop Time	15:07				
Stop DGM Vol	909.842				
Leak Check After	4005 cfm@ 10 "hg	before pulse			
CO2 %	10.1				
O2 %	20.1				
Impingers (1-3)	258				
Dessicant	215				
Leak Check Before	4005 cfm@ 15 "hg				
Start DGM Vol	810.100				
Start Time	13:20				
Stop Time	16:22				
Stop DGM Vol	822.360				
Leak Check After	4005 cfm@ 10 "hg				
CO2 %	15.30				
O2 %	4.0				
Impingers (1-3)	256				
Dessicant	216				

Particulate Laboratory Data

Source: S150-Scrubber
Analysis Date: 3/29/2009
Test Run: 1-3

Run: No.	1	2	3	Blank
Filter: No.	21	22	23	24
Final Weight, mg.	376.8	375.2	376.0	353.3
Tare Weight, mg.	375.8	373.4	373.4	352.2
Weight Gain, mg.	1.0	1.8	2.6	1.1
Acetone Probe Wash:				
Final Weight, mg.	51820.0	49482.1	49628.1	53297.6
Tare Weight, mg.	51814.6	49477.0	49621.2	53297.0
Blank Correction, mg.	-0.2	-0.2	-0.2	
Volume, ml.	29	34	37	100
Weight Gain, mg.	5.2	4.9	6.7	0.6
				0.006 mg/ml
Impinger Water Extracts: (CH ₂ Cl ₂)				
Final Weight, mg..	50261.7	49416.0	49953.9	50465.1
Tare Weight, mg.	50228.9	49350.0	49899.0	50464.9
Blank Correction, mg.	-0.2	-0.2	-0.2	
Weight Gain, mg.	32.6	65.8	54.7	0.2
Impinger Water Residue: 200 ml aliquot				
Final Weight, mg.	108129.0	108350.9	94057.8	111902.2
Tare Weight, mg.	108106.0	108328.2	94034.7	111902.2
Blank Correction, mg.	0.0	0.0	0.0	
Volume, ml.	375	395	375	260
Weight Gain, mg.	43.1	44.8	43.3	0.0
Total Particulate, mg.	81.9	117.3	107.3	

Company	Atlas Resin	Static Pressure	0.0	Cp	0.84
Location	(S150)-Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture, %	6	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	1	Probe Heater Temp	223-273	Kref=	44.7
Stack Dia.& Area	19.5	Filter #	21	Kb =	0.01049
Operator	bfl	Sample Box #	1	Point Time	5

0:05:00

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
12:00	1	5	98	60	60	894.400	0.520	0.7211	2.64	223-273	7
12:05:00	2	5	98	61	60	98.98	0.580	0.7616	2.95	223-273	8
12:10:00	3	5	100	65	60	3.84	0.530	0.7280	2.71	223-273	
12:15:00	4	5	101	69	60	8.62	0.350	0.5916	1.80	223-273	
12:20:00	5	5	101	72	61	12.48	0.260	0.5099	1.35	223-273	
12:25:00	6	5	98	73	62	15.79	0.170	0.4123	0.89	223-273	
12:32:00	7	5	98	73	63	18.52	0.500	0.7071	2.62	223-273	
12:37:00	8	5	98	78	65	23.15	0.530	0.7280	2.81	223-273	8
12:42:00	9	5	98	81	66	27.97	0.520	0.7211	2.78	223-273	
12:47:00	10	5	97	83	68	32.72	0.500	0.7071	2.70	223-273	
12:52:00	11	5	100	84	68	37.38	0.440	0.6633	2.37	223-273	
12:57:00	12	5	97	84	69	41.77	0.260	0.5099	1.41	223-273	
13:02:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					945.040					
Total		60				50.64					
Average			98.7	73.6	63.5		0.4300	0.6468	2.25		

Leak Check Before <.005 cfm at 15"hg Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			286	211
Initial			250	200
Net H2O			36	11
Total H2O Collected, ml			47	

Orsats			
Bag #	CO2	O2	N2
1	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	528.5	Ts=	558.7	Md=	28.84	Acfm=	4726
Pm=	29.62	Ps=	29.45	Ms=	28.38	dscfm=	4209
Vmstd=	49.793	Bwo=	0.043	Vs=	37.975	I=	99.1

Comments:

Company	Atlas Resin	Static Pressure	0	Cp	0.84
Location	(S150)-Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture,%	6	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	2	Probe Heater Temp	223-273	Kref=	44.700
Stack Dia.& Area	19.5	Filter #	22	Kb =	0.0104893
Operator	bfl	Sample Box #	2	Point Time	5

0:05:00

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
9:44	1	5	97	69	69	945.300	0.530	0.7280	2.79	223-273	7
9:49:00	2	5	100	72	69	50.80	0.570	0.7550	3.00	223-273	8
9:54:00	3	5	98	75	68	55.08	0.530	0.7280	2.81	223-273	
9:59:00	4	5	98	79	68	59.82	0.360	0.6000	1.93	223-273	
10:04:00	5	5	98	80	69	63.69	0.290	0.5385	1.56	223-273	
10:09:00	6	5	97	81	69	67.24	0.160	0.4000	0.86	223-273	
10:16:00	7	5	98	81	70	70.02	0.510	0.7141	2.75	223-273	7
10:21:00	8	5	97	85	71	74.75	0.530	0.7280	2.89	223-273	
10:26:00	9	5	98	86	72	79.57	0.500	0.7071	2.73	223-273	
10:31:00	10	5	98	87	73	84.33	0.530	0.7280	2.91	223-273	
10:36:00	11	5	98	88	74	89.17	0.460	0.6782	2.53	223-273	
10:41:00	12	5	97	89	74	93.55	0.270	0.5196	1.49	223-273	
10:46:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					997.120					
Total		60				51.82					
Average			97.8	81.0	70.5		0.4367	0.6521	2.35		

Leak Check Before

<.005 cfm at 15"hg

Leak Check After

<.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			286	211
Initial			250	200
Net H2O			36	11
Total H2O Collected, ml			47	

Orsats			
Bag #	CO2	O2	N2
2	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	535.8	Ts=	557.8	Md=	28.84	Acfm=	4760
Pm=	29.62	Ps=	29.45	Ms=	28.38	dscfm=	4248
Vmstd=	50.280	Bwo=	0.042	Vs=	38.255	I=	99.2

Comments:

Company	Atlas Resin	Static Pressure	0	Cp	0.84
Location	(S150)-Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture, %	6	Y Factor	0.9944
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.275 0.00041
Test Run#	3	Probe Heater Temp	223-273	Kref=	44.700
Stack Dia.& Area	19.5	Filter #	23	Kb =	0.0104893
Operator	bfl	Sample Box #	3	Point Time	5
0:05:00					

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
12:18	1	5	97	73	73	997.400	0.520	0.7211	2.78	223-273	6
12:23:00	2	5	99	74	73	1002.05	0.550	0.7416	2.94	223-273	7
12:28:00	3	5	98	79	72	7.00	0.510	0.7141	2.75	223-273	
12:33:00	4	5	97	83	73	11.74	0.350	0.5916	1.91	223-273	
12:38:00	5	5	98	83	73	15.74	0.270	0.5196	1.47	223-273	
12:43:00	6	5	97	83	73	19.13	0.160	0.4000	0.87	223-273	
12:50:00	7	5	98	83	74	21.85	0.520	0.7211	2.83	223-273	7
12:55:00	8	5	98	85	74	26.74	0.540	0.7348	2.95	223-273	
13:00:00	9	5	97	87	74	31.63	0.500	0.7071	2.75	223-273	
13:05:00	10	5	100	88	75	36.35	0.490	0.7000	2.69	223-273	
13:10:00	11	5	97	88	75	41.00	0.460	0.6782	2.54	223-273	
13:15:00	12	5	97	88	75	45.53	0.240	0.4899	1.33	223-273	
13:20:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					1048.860					
Total		60				51.46					
Average			97.8	82.8	73.7		0.4258	0.6433	2.32		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			286	211
Initial			250	200
Net H2O			36	11
Total H2O Collected, ml			47	

Orsats			
Bag #	CO2	O2	N2
3	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm= 538.3	Ts= 557.8	Md= 28.84	Acfm= 4696
Pm= 29.62	Ps= 29.45	Ms= 28.37	dscfm= 4189
Vmstd= 49.695	Bwo= 0.043	Vs= 37.740	I= 99.4

Comments:

Location:	(S150)-Scrubber Outlet			
Date:	03/19/09			
Time:	12:00	9:44	12:18	
	13:02	10:46	13:20	
Test Run	1	2	3	Average

STACK GAS DATA:

Temperature:	98.7	97.8	97.8	98.1
Velocity, ft/sec.	37.975	38.255	37.740	37.990
Gas Volume, acfm	4,726	4,760	4,696	4,727
Gas Volume, scfm (wet)	4,396	4,435	4,376	4,402
Gas Volume, scfm (dry)	4,209	4,248	4,189	4,215
Moisture, %	4.3	4.2	4.3	4.2
Carbon Dioxide, % (dry)	0.0	0.0	0.0	0.0
Oxygen, % (dry)	20.9	20.9	20.9	20.9
Nitrogen, % (dry)	79.1	79.1	79.1	79.1
Molecular Weight, (dry)	28.84	28.84	28.84	28.84
Molecular Weight, (wet)	28.38	28.38	28.37	28.38

SAMPLING DATA:

Total Time, min.	60	60	60	
Volume, dscf	49.793	50.280	49.695	
Isokinetic Ratio, %	99.1	99.2	99.4	

PARTICULATE EMISSION RATES:

Fronthalf Particulate, mg	6.2	6.7	9.3	7.4
Emission Rate, Fronthalf lbs/hr.	0.0693	0.0749	0.1037	0.0826
Total Particulate Collected, mg	81.9	117.3	107.3	102.2
Concentration, grains/dscf	0.02533	0.03593	0.03325	0.03150
Concentration, lbs/dscf	3.6268E-06	5.1441E-06	4.7610E-06	4.511E-06
Emission Rate, Total lbs/hr.	0.9159	1.3111	1.1967	1.1412
Emission Rate, lb/1000 lb Stack Gas	0.0472	0.0669	0.0619	0.0586

Sample Calculations, Run #1

Static Pressure, "H2O=	0	Nozzle Diameter=	0.275
Barometric Pressure, "hg=	29.45	Nozzle Area, sq. ft.=	0.00041
Meter h Coeff=	1.73	Absolute Stack Temp, R=	558.7
Y Factor=	0.9944	Absolute Meter Temp, R=	528.5
Dry Gas Meter Volume, Cu. Ft.=	50.64	Ave sqrt delta p=	0.6468
Water Collected, (Vlc), mls=	47	Stack Area, sq. ft.=	2.07
Absolute Stack Pressure, "Hg=	29.45	Pitot Tube Coeff., Cp=	0.84
Absolute Meter Pressure, " Hg=	29.62	Sampling Time, Min.=	60
Percent Oxygen=	20.9	Particulate, (Mn),mg=	81.9
Percent Carbon Dioxide=	0.0		
Percent Nitrogen=	79.1		

Volume of Sample at Standard Conditions, Dry Basis

$$17.647 * Y * Vm * Pm / Tm = Vmsd$$

$$17.647 \quad 0.9944 \quad 50.64 \quad 29.62 \quad 528.5 \qquad \qquad \qquad Vmsd = \underline{49.793}$$

Volume of Water Vapor in Sample at Standard Conditions

$$.04707 * Vlc = Vwstd$$

$$0.04707 \quad 47 \qquad \qquad \qquad Vwstd = \underline{2.212}$$

Proportion of Water Vapor in Gas Stream

$$Vwstd / (Vmsd + Vwstd) = Bwo$$

$$2.212 \quad 49.793 \quad 2.212 \qquad \qquad \qquad Bwo = \underline{0.043}$$

Concentration of Particulate Matter, Dry Basis

$$Mn * .0154 / Vmstd = C's$$

$$81.9 \quad 0.0154 \quad 49.793 \qquad \qquad \qquad C's = \underline{0.025330}$$

$$Mn * 2.205E-06 / Vmstd = Cs$$

$$81.9 \quad 2.205E-06 \quad 49.79298 \qquad \qquad \qquad Cs = \underline{3.627E-06}$$

Dry Molecular Weight of Stack Gas

$$.44 * \%CO_2 + .32 * \%O_2 + .28 * \%N_2 = Md$$

$$0.44 \quad 0.0 \quad 0.32 \quad 20.9 \quad 0.28 \quad 79.1 \qquad \qquad \qquad Md = \underline{28.836}$$

Molecular Weight of Stack Gas, Wet Basis

$$Md * (1-Bwo) + 18 * Bwo = Ms$$

$$28.836 \quad 0.957 \quad 18 \quad 0.043 \qquad \qquad \qquad Ms = \underline{28.375}$$

Stack Gas Velocity, fps

$$85.49 * Ave sqrt p * Cp * SQRT(Ts) / Ps / Ms = Vs$$

$$85.49 \quad 0.647 \quad 0.84 \quad 558.7 \quad 29.45 \quad 28.375 \qquad \qquad \qquad Vs = \underline{37.975}$$

Volumetric Flow Rate, dscfh

$$63529 * (1-Bwo) * Vs * Stk Area * Ps / Ts = Qs$$

$$63529 \quad 0.957 \quad 37.975 \quad 2.07 \quad 29.45 \quad 558.7 \qquad \qquad \qquad Qs = \underline{252.536}$$

Emission Rate, lbs/hr

$$Qs * Cs = E.R.$$

$$252.536 \quad 3.627E-06 \qquad \qquad \qquad E.R. = \underline{0.915899}$$

Percent of Isokinetic Sampling

$$1.6667 * (.00267 * Vlc + Y * Vm / Tm * Pm) * Ts / 558.7 = I$$

$$1.6667 \quad 0.00267 \quad 47 \quad 0.9944 \quad 50.64 \quad 528.5 \quad 29.62 \quad 558.7 \quad 60 \quad 37.975 \quad 29.45 \quad 0.000412 \qquad \qquad \qquad I = \underline{99.1}$$

Company	Atlas Resin	Static Pressure	0.0	Cp	0.84
Location	Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture,%	6	Y Factor	1.0135
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.00000
Test Run#	1	Probe Heater Temp	223-273	Kref=	43.93
Stack Dia.& Area	19.5	Filter #	1	Kb =	0.00000
Operator	bfl	Sample Box #	1	Point Time	5
0:05:00					

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
9:15	1	5		54	54	576.665			0.00	223-273	
9:20:00	2	5		54	54	76.69			0.00	223-273	
9:25:00	3	5		54	54	76.71			0.00	223-273	
9:30:00	4	5		54	54	76.73			0.00	223-273	
9:35:00	5	5		54	54	76.75			0.00	223-273	
9:40:00	6	5		54	54	76.77			0.00	223-273	
9:45:00	7	5		54	54	76.79			0.00	223-273	
9:50:00	8	5		55	55	76.81			0.00	223-273	
9:55:00	9	5		55	55	76.84			0.00	223-273	
10:00:00	10	5		55	55	76.86			0.00	223-273	
10:05:00	11	5		55	55	76.88			0.00	223-273	
10:10:00	12	5		55	55	76.90			0.00	223-273	
10:15:00	13									223-273	
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					576.918					
Total		60				0.253					
Average		#DIV/0!	54.4	54.4			#DIV/0!	#DIV/0!	0.00		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			250	211
Initial			250	200
Net H ₂ O			0	11
Total H ₂ O Collected, ml				11

Orsats			
Bag #	CO ₂	O ₂	N ₂
1	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	514.4	Ts=	#DIV/0!	Md=	28.84	Acfm=	#DIV/0!
Pm=	29.45	Ps=	29.45	Ms=	21.61	dscfm=	#DIV/0!
Vmstd=	0.259	Bwo=	0.667	Vs=	#DIV/0!	I=	#DIV/0!

Comments:

Company	Atlas Resin	Static Pressure	0	Cp	0.84
Location	Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture, %	6	Y Factor	1.0135
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.000 0.00000
Test Run#	2	Probe Heater Temp	223-273	Kref=	43.930
Stack Dia.& Area	19.5	Filter #	2	Kb =	0
Operator	bfl	Sample Box #	2	Point Time	5

0:05:00

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
9:45	1	5		57	57	576.930			0.00	223-273	
9:50:00	2	5		57	57	76.95			0.00	223-273	
9:55:00	3	5		57	57	76.97			0.00	223-273	
10:00:00	4	5		57	57	76.99			0.00	223-273	
10:05:00	5	5		57	57	77.01			0.00	223-273	
10:10:00	6	5		57	57	77.03			0.00	223-273	
10:15:00	7	5		57	57	77.06			0.00	223-273	
10:20:00	8	5		57	57	77.08			0.00	223-273	
10:25:00	9	5		57	57	77.10			0.00	223-273	
10:30:00	10	5		57	57	77.12			0.00	223-273	
10:35:00	11	5		57	57	77.14			0.00	223-273	
10:40:00	12	5		57	57	77.16			0.00	223-273	
10:45:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					577.180					
Total	60					0.25					
Average		#DIV/0!	57.0	57.0			#DIV/0!	#DIV/0!	0.00		

Leak Check Before

<.005 cfm at 15"hg

Leak Check After

<.005 cfm at 10"hg

Impingers			
Collected	1	2	3
Final			250
Initial			250
Net H2O		0	11
Total H2O Collected, ml			11

Orsats			
Bag #	CO2	O2	N2
2	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm= 517.0 Ts= #DIV/0!
Pm= 29.45 Ps= 29.45
Vmstd= 0.255 Bwo= 0.670

Md= 28.84 Acfm= #DIV/0!
Ms= 21.57 dscfm= #DIV/0!
Vs= #DIV/0! l= #DIV/0!

Comments:

Company	Atlas Resin	Static Pressure	0	Cp	0.84
Location	Scrubber Outlet	Barometric Pressure	29.45	Meter H@	1.73
Date	03/19/09	Assumed Moisture,%	6	Y Factor	1.0135
Ambient Temp	60	Heating Box Temp	223-273	Nozzle Dia	0.000 0.00000
Test Run#	3	Probe Heater Temp	223-273	Kref=	43.930
Stack Dia.& Area	19.5	Filter #	3	Kb =	0
Operator	bfl	Sample Box #	3	Point Time	5
0:05:00					

Dry Gas Meter											
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Delta P	Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
12:20	1	5		59	59	577.200			0.00	223-273	
12:25:00	2	5		59	59	77.22			0.00	223-273	
12:30:00	3	5		59	59	77.24			0.00	223-273	
12:35:00	4	5		59	59	77.26			0.00	223-273	
12:40:00	5	5		59	59	77.28			0.00	223-273	
12:45:00	6	5		59	59	77.30			0.00	223-273	
12:50:00	7	5		59	59	77.33			0.00	223-273	
12:55:00	8	5		60	60	77.35			0.00	223-273	
13:00:00	9	5		60	60	77.37			0.00	223-273	
13:05:00	10	5		60	60	77.39			0.00	223-273	
13:10:00	11	5		60	60	77.41			0.00	223-273	
13:15:00	12	5		60	60	77.43			0.00	223-273	
13:20:00	13									223-273	
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					577.450					
Total		60				0.25					
Average		#DIV/0!		59.4	59.4		#DIV/0!	#DIV/0!	0.00		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Impingers			
Collected	1	2	3
Final			250
Initial			250
Net H2O		0	11
Total H2O Collected, ml			11

Orsats			
Bag #	CO2	O2	N2
3	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	519.4	Ts=	#DIV/0!	Md=	28.84	Acfm=	#DIV/0!
Pm=	29.45	Ps=	29.45	Ms=	21.56	dscfm=	#DIV/0!
Vmstd=	0.254	Bwo=	0.671	Vs=	#DIV/0!	I=	#DIV/0!

Comments:

Location:	Scrubber Outlet		
Date:	03/19/09		
Time:	9:15	9:45	12:20
	10:15	10:45	13:20
Test Run	1	2	3
			Average

STACK GAS DATA:

Temperature:	99	98	98	98.1
Velocity, ft/sec.	37.975	38.255	37.740	37.990
Gas Volume, acfm	4,726	4,760	4,696	4,727
Gas Volume, scfm (wet)	4,396	4,435	4,376	4,402
Gas Volume, scfm (dry)	4,209	4,248	4,189	4,215
Moisture, %	4.3	4.2	4.3	4.2
Carbon Dioxide, % (dry)	0.0	0.0	0.0	0.0
Oxygen, % (dry)	20.9	20.9	20.9	20.9
Nitrogen, % (dry)	79.1	79.1	79.1	79.1
Molecular Weight, (dry)	28.84	28.84	28.84	28.84
Molecular Weight, (wet)	28.38	28.38	28.37	28.38

SAMPLING DATA:

Total Time, min.	60	60	60
Volume, dscf	0.259	0.255	0.254
Isokinetic Ratio, %	#DIV/0!	#DIV/0!	#DIV/0!

PHENOL EMISSION RATE:

Total Phenol Collected, mg	0.730	0.045	0.280	0.352
Sample Volume, liters	7.34	7.21	7.18	7.24
Phenol Concentration, mg/m ³	99.50	6.24	39.00	48.25
Phenol Emission Rate, lb/hr	1.5689	0.0993	0.6121	0.7601

Inlet - Large Duct

3/19/2009

Velocity Traverse data								Run #3								Average
Run #1				Run #2				Run #3								
Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	Delta P	sqrt(delta P)	
0.40	0.6325	0.55	0.7416	0.50	0.7071	0.50	0.7071	0.40	0.6325	0.50	0.7071	0.45	0.6708	0.60	0.7746	
0.45	0.6708	0.60	0.7746	0.55	0.7416	0.60	0.7746	0.45	0.6708	0.50	0.7071	0.45	0.6708	0.50	0.7071	
0.40	0.6325	0.50	0.7071	0.50	0.7071	0.50	0.7071	0.40	0.6325	0.45	0.6708	0.40	0.6325	0.45	0.6708	
0.40	0.6325	0.40	0.6325	0.40	0.6325	0.45	0.6708	0.45	0.6708	0.35	0.5916	0.45	0.6708	0.35	0.5916	
0.45	0.6708	0.35	0.5916	0.45	0.6708	0.35	0.5916	0.50	0.7071	0.35	0.5916	0.50	0.7071	0.35	0.5916	
0.50	0.7071	0.35	0.5916	0.50	0.7071	0.35	0.5916	0.25	0.5000	0.30	0.5477	0.25	0.5000	0.30	0.5477	
0.25	0.5000	0.30	0.5477	0.25	0.5000	0.30	0.5477	0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	
0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	0.25	0.5000	
Pitot Coff		0.99														
sqrt(delta P)		0.6271													0.6297	0.6326
Static Pres.		-1.20													-1.20	-1.20
Temp. F (db)		119													122	119
Temp. F (wb)		76													78	75
Vapor Pres.		0.9046													0.9666	0.8875
Baro. Pres		29.45													29.45	29.45
Stack Pres, Ps		29.36													29.36	29.36
%CO2		0.0													0.0	0.0
%O2		20.8													20.8	20.8
%N2		79.2													79.2	79.2
%H2O		1.54%													1.72%	1.5%
MW (d)		28.83													28.83	28.83
MW (w)		28.67													28.65	28.67
Stack Dia.		16													16	16
Stack Area		1.396													1.396	1.396
Velocity, ft/sec.		44.017													44.332	44.399
ACFM		3,688													3,714	3,720
SCFM (w)		3,300													3,306	3,329
SCFM (d)		3,249													3,250	3,280
Sample Vol, Liters		1.97													1.86	2.04
Phenol, mg		0.250													0.190	0.15
Phenol, mg/Cu. M		126.9													102.2	78.4
Inlet Large Duct - Phenol, #/hr		1.545													1.244	0.955
Air flow Volume, small duct		960													940	935
Sample Vol, Liters		12.43													13.41	12.86
Phenol, mg		0.100													0.084	0.10
Phenol, mg/Cu. M		8.05													6.26	7.65
Inlet Small Duct - Phenol, #/hr		0.029													0.022	0.027
Phenol, Total inlet lbs/hr		1.574													1.266	0.982
Phenol, Outlet lbs/hr		1.569													0.612	0.760
Phenol, Des Eff. %		0.3%													51.6%	19.3%
VOC as Propane Results																
Inlet, ppm		295.4													416.5	324.1
Moisture		1.5													1.7	
Inlet ppm, dry		300.0													423.8	329.0
Inlet VOC Emission Rate, lb/hr		6.680													9.436	7.38
Outlet, ppm		171.0													172.2	171.1
Moisture		4.3													4.2	
Outlet ppm, dry		178.6													179.8	178.6
Outlet VOC Emission Rate, lb/hr		5.151													5.161	5.16
VOC Des. Eff. %		22.9%													45.3%	27.5%

Emission Testing Comment Sheet						
Date:	3/19/07					
Site	RTH	Date:	2/25/07	Cp=	37	
Source	Scrubber outlet	Y=	4744	Nozzle=	215	
BP	30.45-1.0	Delta H=	1.73			
Leak Check Before	2005 cfm@ 15 "hg	outlet	Q = 0	int	Q = 0	
Start DGM Vol	742	742 = 742			742 = 742	
Start Time	10:44	9:11 = 477 = 466.82			477 = 475	
Stop Time	10:47	23L = 218				
Stop DGM Vol	775.040	3L = 34				
Leak Check After	2005 cfm@ 10 "hg					
CO2 %		Q = 7				
O2 %		742 = 780			742 = 780	
Impingers (1-3)	286					
Dessicant	212	outlet	int	new	old	
Leak Check Before	2005 cfm@ 15 "hg	outlet	Q = 0	int	Q = 0	
Start DGM Vol	742.300					
Start Time	10:44	10:43				
Stop Time	11:46					
Stop DGM Vol	777.124					
Leak Check After	2005 cfm@ 10 "hg					
CO2 %		Q = 1			Q = 0	
O2 %		742 = 752			742 = 760	
Impingers (1-3)	223					
Dessicant	212	outlet	int	new	old	
Leak Check Before	2005 cfm@ 15 "hg	outlet	Q = 0	int	Q = 0	
Start DGM Vol	747.400					
Start Time	13:16	12:30				
Stop Time	13:20	13:16				
Stop DGM Vol	1078.860					
Leak Check After	2005 cfm@ 10 "hg					
CO2 %		Q = 1			Q = 3	
O2 %		742 = 747			742 = 750	
Impingers (1-3)	286	outlet	int	new	old	
Dessicant	212					

Emission Testing Comment Sheet					
Date:	3/18/09	Date:		Cp=	
Site	Filter	Y=		Nozzle=	
Source	desiccator	Delta H=			
BP	30.45 - 1.0		<th></th> <td></td>		
Leak Check Before	0.0 cfm@ 10 "hg	14 min			
Start DGM Vol	576.915	9:15			
Start Time	9:15				
Stop Time	10:19				
Stop DGM Vol	576.918				
Leak Check After	0.0 cfm@ 6 "hg				
CO2 %	25.91				
O2 %	20.33				
Impingers (1-3)		tube id outlet small in small out			
Dessicant			1724	1692	1693
Leak Check Before	0.0 cfm@ 10 "hg				
Start DGM Vol	576.930	10:42			
Start Time	10:45				
Stop Time	11:45	11:48			
Stop DGM Vol	572.80				
Leak Check After	0.0 cfm@ 6 "hg				
CO2 %	25.54				
O2 %	20.22				
Impingers (1-3)		outlet small in small out			
Dessicant			1699	1697	1696
Leak Check Before	0.0 cfm@ 10 "hg				
Start DGM Vol	577.200				
Start Time	12:20	12:17			
Stop Time	13:20	13:25			
Stop DGM Vol	577.450				
Leak Check After	0.0 cfm@ 6 "hg				
CO2 %	25.41				
O2 %	20.19				
Impingers (1-3)		outlet small in small out			
Dessicant			1701	1695	1700

Plant	Plant	Plant	
Source id.	Source id.	Source id.	
Date	Date	Date	
Stack Diameter	Stack Diameter	Stack Diameter	
Baro Pres	Baro Pres	Baro Pres	
Pitot tube Coff	Pitot tube Coff	Pitot tube Coff	
Operators	Operators	Operators	
Run #	Run #	Run #	
Traverse	Vel Hd	Temp	
Pt. No.	Delta p	Pt. No.	
1	45	1	45
2	46	2	47
3	46	3	48
4	47	4	49
5	45	5	45
6	50	6	50
7	25	7	25
8	25	8	25
9	50	9	50
10	50	10	50
11	50	11	50
12	45	12	45
13	35	13	35
14	35	14	35
15	30	15	30
16	25	16	25
17		17	
18		18	
19		19	
20		20	
21		21	
22		22	
23		23	
24		24	
25		25	
26		26	
27		27	
28		28	
29		29	
30		30	
31		31	
32		32	
33		33	
34		34	
35		35	
36		36	
37		37	
38		38	
39		39	
40		40	
Temp-DB	44?	Temp-DB	44
Temp-WB	72	Temp-WB	72
Static	-1.2	Static	-1.2

Inlet Dataq Electronic Data Recorder Readings

Run #1

UNITS	"ppm"
CHANNEL #	1
# OF POINTS	901
MEAN	+2.9541E+02
STD DEVIATION	+2.0577E+02
MINIMUM	+1.0985E+02
MEDIAN	+2.2339E+02
MAXIMUM	+1.0015E+03
START POINT TBF	2892.
END POINT TBF	6492.
FILE	atlas 032009.WDQ

Run #2

UNITS	"ppm"
CHANNEL #	1
# OF POINTS	901
MEAN	+2.6030E+02
STD DEVIATION	+1.6954E+02
MINIMUM	+1.0399E+02
MEDIAN	+1.9717E+02
MAXIMUM	+1.0015E+03
START POINT TBF	8412.
END POINT TBF	12012.
FILE	atlas 032009.WDQ

Run #3

UNITS	"ppm"
CHANNEL #	1
# OF POINTS	901
MEAN	+4.1653E+02
STD DEVIATION	+2.8200E+02
MINIMUM	+9.1308E+01
MEDIAN	+3.0046E+02
MAXIMUM	+1.0015E+03
START POINT TBF	14112.
END POINT TBF	17712.
FILE	atlas 032009.WDQ

Outlet Dataq Electronic data recorder Readings

Run #1

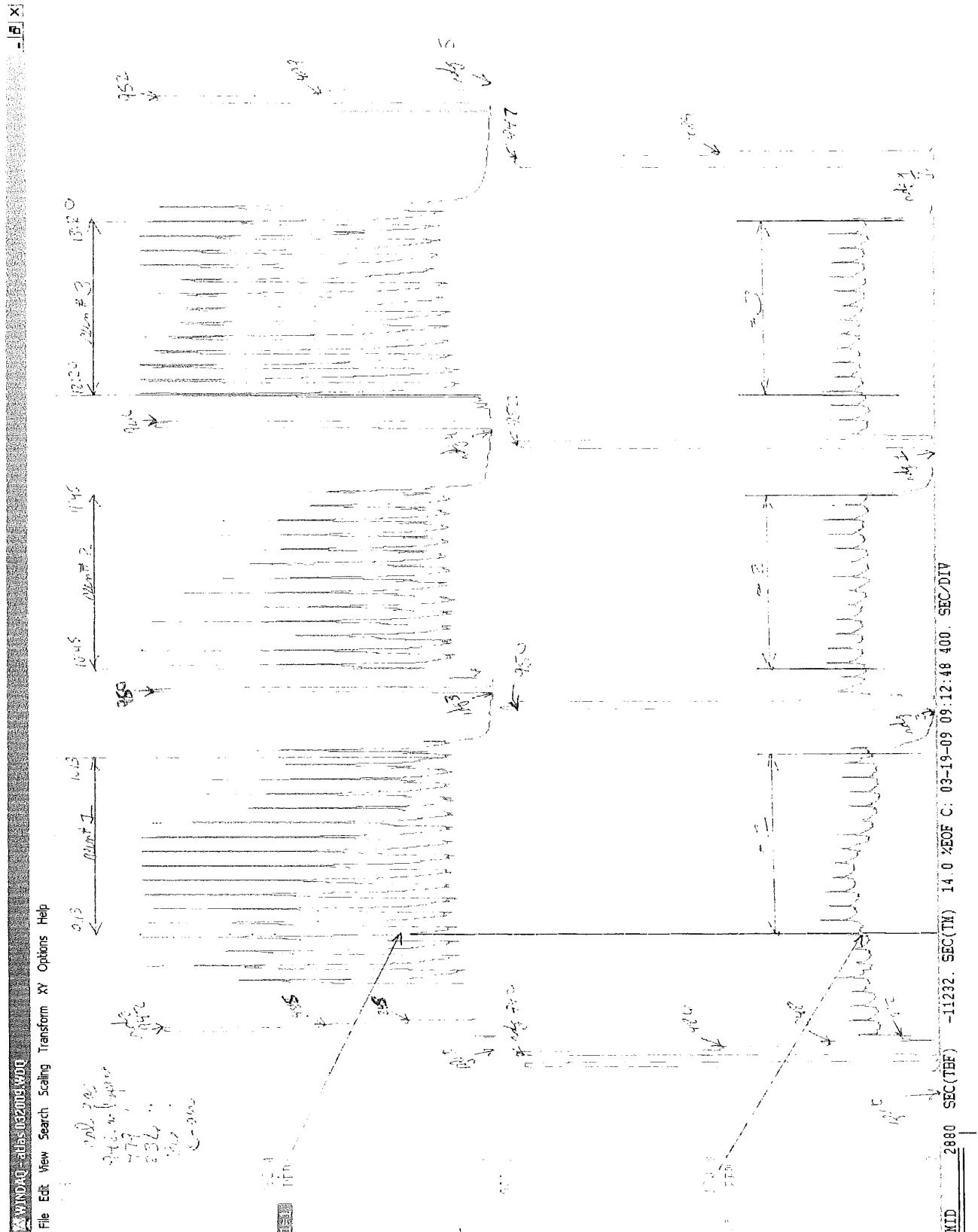
UNITS	"ppm"
CHANNEL #	2
# OF POINTS	901
MEAN	+1.7096E+02
STD DEVIATION	+2.7908E+01
MINIMUM	+1.2854E+02
MEDIAN	+1.7612E+02
MAXIMUM	+2.7751E+02
START POINT TBF	2892.
END POINT TBF	6492.
FILE	atlas 032009.WDQ

Run #2

UNITS	"ppm"
CHANNEL #	2
# OF POINTS	901
MEAN	+1.7001E+02
STD DEVIATION	+1.8189E+01
MINIMUM	+1.4738E+02
MEDIAN	+1.6548E+02
MAXIMUM	+2.6039E+02
START POINT TBF	8412.
END POINT TBF	12012.
FILE	atlas 032009.WDQ

Run #3

UNITS	"ppm"
CHANNEL #	2
# OF POINTS	901
MEAN	+1.7224E+02
STD DEVIATION	+1.8377E+01
MINIMUM	+1.4677E+02
MEDIAN	+1.6939E+02
MAXIMUM	+2.6455E+02
START POINT TBF	14112.
END POINT TBF	17712.
FILE	atlas 032009.WDQ





Bureau Veritas

Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522

TO:
BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAR 27, 2009
SAMPLES REC'D MAR 24, 2009
REQUEST NUMBER 536805
PAGE NUMBER 1 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE	/		ANALYZED DATE	
			RESULTS			
29201724	7.33 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 730 Back < 5.0			MAR 27, 2009 Parts Per Million Front 26 Back < 0.18	
29201699	7.22 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 45 Back < 5.0			MAR 27, 2009 Parts Per Million Front 1.6 Back < 0.18	
29201701	7.19 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 280 Back < 5.0			MAR 27, 2009 Parts Per Million Front 10 Back < 0.18	
29201692	12.43 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 100 Back < 5.0			MAR 27, 2009 Parts Per Million Front 2.1 Back < 0.1	

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Vice President, Laboratory Services



Bureau Veritas

Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
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Lake Zurich, IL 60047
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BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAR 27, 2009
SAMPLES REC'D MAR 24, 2009
REQUEST NUMBER 536805
PAGE NUMBER 2 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE	RESULTS		ANALYZED DATE
29201697	12.75 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 110 Back < 5.0	Front 2.2	Back < 0.1	MAR 27, 2009 Parts Per Million
29201695	13.41 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 84 Back < 5.0	Front 1.6	Back < 0.097	MAR 27, 2009 Parts Per Million
29201700	1.86 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 190 Back < 5.0	Front 27	Back < 0.7	MAR 27, 2009 Parts Per Million
29201726	1.91 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front < 5.0 Back < 5.0	Front < 0.68	Back < 0.68	MAR 27, 2009 Parts Per Million

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Vice President, Laboratory Services



Bureau Veritas

Health, Safety & Environmental Services

Laboratory Analysis Report

Industrial Hygiene Laboratory
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Lake Zurich, IL 60047
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TO: BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAR 27, 2009
SAMPLES REC'D MAR 24, 2009
REQUEST NUMBER 536805
PAGE NUMBER 3 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE	RESULTS				ANALYZED DATE
29201696	2.3 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 14 Back 6.5	Front 1.5	Back 0.73	Parts Per Million		MAR 27, 2009
29201693	1.97 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms Front 250 Back < 5.0	Front 33	Back < 0.66	Parts Per Million		MAR 27, 2009
29201686 (BLANK)		XAD-7 Tube Micrograms Front < 5.0 Back < 5.0 NONE DETECTED					MAR 27, 2009

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Vice President, Laboratory Services



Bureau Veritas

Health, Safety & Environmental Services

Industrial Hygiene Laboratory

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Lake Zurich, IL 60047
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TO: BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAR 27, 2009
SAMPLES REC'D MAR 24, 2009
REQUEST NUMBER 536805
PAGE NUMBER 4 OF 5

REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
5 Micrograms	PHENOL XADG	MODIFIED NIOSH 2546 GAS CHROMATOGRAPHY	108-95-2

COMMENTS:

- * CONCENTRATION CALCULATED USING AIR VOLUMES SUPPLIED BY CLIENT
- * UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
- * MODIFICATIONS MAY BE MADE TO ABOVE METHODS TO OPTIMIZE RESULTS (AVAILABLE UPON REQUEST)
- * RESULTS ARE STRICTLY LIMITED TO SAMPLES ANALYZED

Respectfully submitted,

William M. Walsh, CIH, ROH
Vice President, Laboratory Services



Bureau Veritas
Health, Safety & Environmental Services

Industrial Hygiene Laboratory

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NEENAH, WI 54956
USA

REPORT DATE MAR 27, 2009
SAMPLES REC'D MAR 24, 2009
REQUEST NUMBER 536805
PAGE NUMBER 5 OF 5

	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: PO #BLE15472, 39006483. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

William M. Walsh, CIH, ROH
Vice President, Laboratory Services

REQUEST FOR LABORATORY
ANALYTICAL SERVICES

ANALYTICAL

Request No. 536805



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Bureau Veritas North America, Inc.

Chicago Lab
Health Unit
Vol. 2 No. 1

Chicago Lab
95 Oakwood Road
Lake Zurich, IL 60047
(888) 576-7522
(847) 726-3320
Fax: (847) 726-3923

49

ARP-Taylor01380

BADGER LABORATORIES & ENGINEERING CO., INC.

SAMPLE RECEIPT FORM

SAMPLE RECEIPT FORM

CLIENT INFORMATION

COMPANY: _____
NAME: _____
ADDRESS: _____

PHONE/FAX: _____
P.O. #: _____
PROJECT/SITE: _____
REPORT & BILL TO: _____
ADDITIONAL REPORTS TO: _____

CHAIN OF CUSTODY RECORD

FILLED IN BY CUSTOMER	FILLED IN BY BADGER LABS & ENG
SAMPLED BY:	RECEIVED BY:
DATE/TIME SAMPLED:	DATE/TIME RECEIVED:
RELINQUISHED BY:	LOGGED IN:

* Temperature over 4°C are above EPA/DNR Protocol unless received on ice.

* EP = If pH was not correct, extra preservation was added until correct pH was achieved.

* PIF= Preserved in field.
* PIL= Preserved in lab.

sampprct2.xls
11-26-08

BADGER LABORATORIES & ENGINEERING CO., INC
 Field Sample Log Sheet - Chain of Custody Form

Client: Flame Test
 Location: West Paper

Date	Sample id	Analysis	Preservation	Comments	Tech
1/1/01	Filter-Run#1	1/1/01			1/1/01
	Filter-Run#2				
	Filter-Run#3				
	Filter-Blank				
	Probe Wash-Run#1		1/1/01		
	Probe Wash-Run#2				
	Probe Wash-Run#3				
	Acetone Blank				
	Impinger H2O-Run#1				
	Impinger H2O-Run#2				
	Impinger H2O-Run#3				
	H2O Blank				
	Impinger MeCl2-Run#1				
	Impinger MeCl2-Run#2				
	Impinger MeCl2-Run#3				
	MeCl2 Blank				

Rel'd By	Rec'd By	Date/Time	Comments
1/1/01	1/1/01	1/1/01	
			1/1/01

BADGER LABORATORIES & ENGINEERING CO., INC
 Field Sample Log Sheet - Chain of Custody Form

Client: Alpha Beta
 Location: East Bay Refinery

Date	Sample id	Analysis	Preservation	Comments	Tech
7/12/2012	Filter-Run#1	PA	/		PA
	Filter-Run#2	/	/		
	Filter-Run#3	/	/		
	Filter-Blank	/	/		
	Probe Wash-Run#1				
	Probe Wash-Run#2				
	Probe Wash-Run#3				
	Acetone Blank				
	Impinger H2O-Run#1				
	Impinger H2O-Run#2				
	Impinger H2O-Run#3				
	H2O Blank				
	Impinger MeCl2-Run#1				
	Impinger MeCl2-Run#2				
	Impinger MeCl2-Run#3				
	MeCl2 Blank				

Rel'd By	Rec'd By	Date/Time	Comments
<u>PA</u>	<u>PA</u>	<u>7/12/2012</u>	
			<u>PA</u>

BADGER LABORATORIES & ENGINEERING CO., INC
 Field Sample Log Sheet - Chain of Custody Form

Client: _____
 Location: _____

Date	Sample id	Analysis	Preservation	Comments	Tech
1/20/01	Filter-Run#1	FF			
	Filter-Run#2	/			
	Filter-Run#3				
	Filter-Blank				
	Probe Wash-Run#1				
	Probe Wash-Run#2				
	Probe Wash-Run#3				
	Acetone Blank				
	Impinger H2O-Run#1				
	Impinger H2O-Run#2				
	Impinger H2O-Run#3				
	H2O Blank				
	Impinger MeCl2-Run#1				
	Impinger MeCl2-Run#2				
	Impinger MeCl2-Run#3				
	MeCl2 Blank				

Rel'd By	Rec'd By	Date/Time	Comments
_____	(b)D	1/20/01 2:00	

**CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol**

Airgas Speciality Gases
12722 S. Wentworth Avenue
Chicago, IL 60628
1-773-785-3000
FAX: 1-773-785-1928
www.airgas.com

Part Number: E02AI99E80A2919 Reference Number: 54-124148886-1
Cylinder Number: LL41810 Cylinder Volume: 85 Cu.Ft.
Laboratory: ASG - Chicago - IL Cylinder Pressure: 2214 PSIG
Analysis Date: Aug 20, 2008 Valve Outlet: 590

Expiration Date: Aug 20, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 150 psig, i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Method	Total Relative Uncertainty
PROPANE	900.0 PPM	941.8 PPM	GC	+/- 1% NIST Traceable
All Other Components	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	010506	SG9133675	965.6PPM PROPANE/	May 01, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet Nexus	FTIR	Aug 04, 2008

Triad Data Available Upon Request

Notes:

Curt Stewart
QA Approval

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: Pure Gas

Part Number:	NI CZ15A	Reference Number:	101-105252192-1
Cylinder Analyzed:	CC254960	Cylinder Volume:	142 Cubic Feet
Laboratory:	NOC - Aurora - IL	Cylinder Pressure:	2000 PSIG
Analysis Date:	Dec 03, 2007	Valve Outlet:	580
Lot #:	101-105252192-1		

ANALYTICAL RESULTS

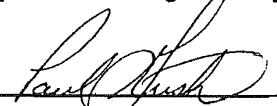
Component	Requested Purity	Certified Concentration
NitrogenCEM	99.9995%	99.9995%
CARBON DIOXIDE	< 1 PPM	< 1 PPM
Moisture	< 1 PPM	0.16 PPM
NOx	< 0.1 PPM	< 0.1 PPM
SO2	< 0.1 PPM	< 0.1 PPM
THC	< 0.1 PPM	< 0.1 PPM
CARBON MONOXIDE	< 0.5 PPM	< 0.5 PPM
Oxygen	< 0.5 PPM	0.45 PPM

Cylinders in Batch:

CC254825, CC254835, CC254839, CC254841, CC254843, CC254845, CC254847, CC254849, CC254853, CC254857, CC254956, CC254958, CC254960, CC254964, CC254978, CC254980, CC255106, CC255108, CC255109, CC255113, CC255115, CC255118, CC255120

Notes:

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.


QA Approval

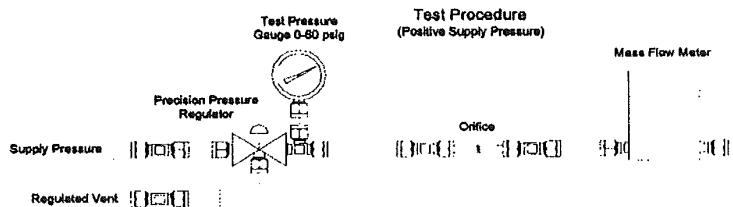
Page 1 of 101-105252192-1

Millennium Instruments Inc.

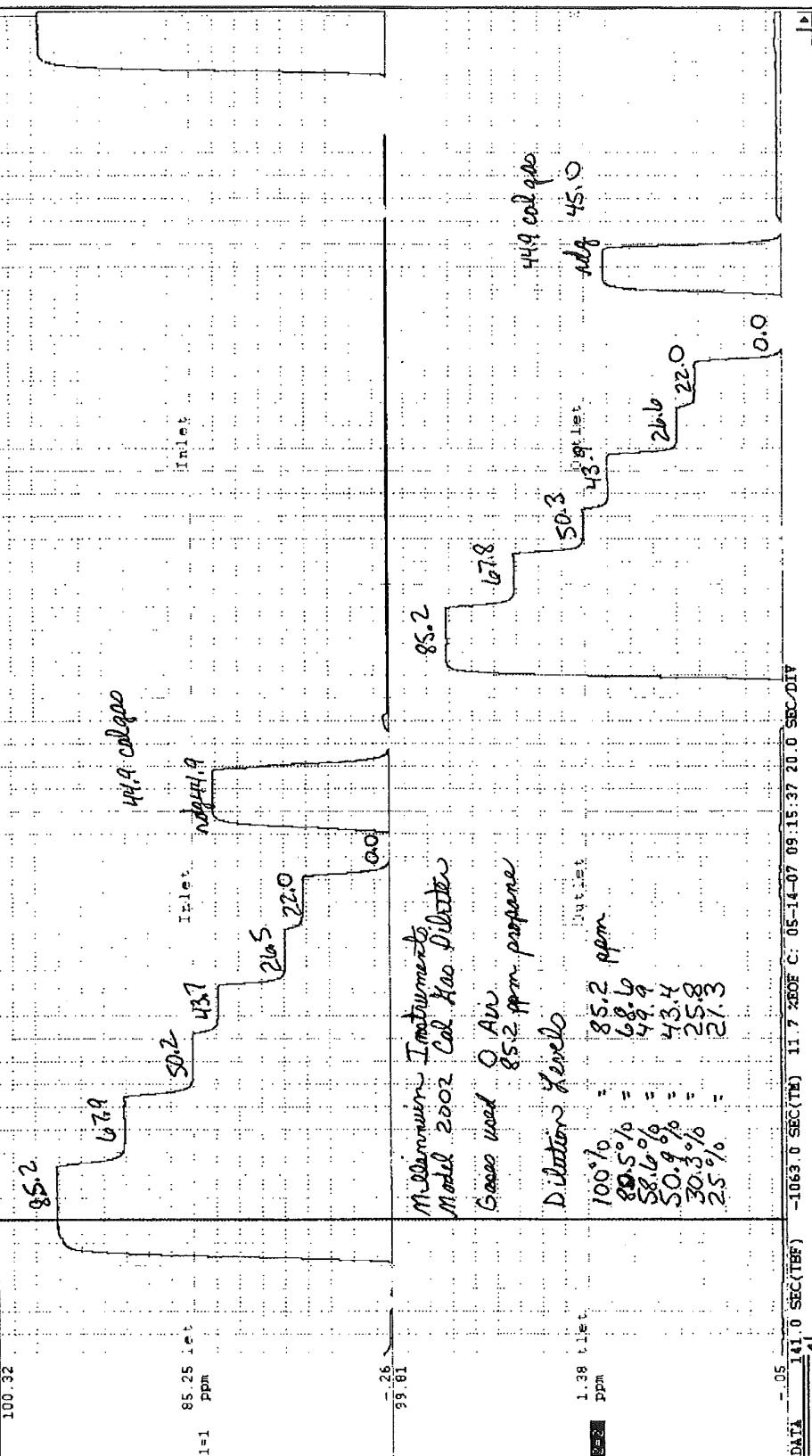
Model 2002 Cal Gas Diluter Calibration Data Sheet

Orifice Calibration Data

Orifice Label	actual dilution	Pressure 20 P.S.I.G.	
K-11 (A)		1.42	L.P.M.
K-21 (B)		5.04	L.P.M.
K-19 (25%)	25.0 %	4.27	L.P.M.
K-17 (30%)	30.3 %	3.26	L.P.M.
K-21 (50%)	50.9 %	4.86	L.P.M.
K-17 (60%)	58.4 %	3.56	L.P.M.
K-10 (80%)	80.5 %	1.22	L.P.M.



P.O. Box 340 Spring Grove, Illinois 60081
Tel: 815.675.3225 / Fax: 815.675.6965
E-mail: millennium@millinst.com / WWW: www.millinst.com



TYPE S PITOT TUBE INSPECTION DATA

Date: 2/23/09

Pitot Number: 4-9-03-3

Pitot tube assembly level? yes x no _____

Pitot tube opening damage? yes _____ no x
If yes explain below.

α_1 1 ($<10^\circ$) α_2 0 ($<10^\circ$)

$\beta_1 =$ 1 ($<5^\circ$) β_2 1 ($<5^\circ$)

$\gamma =$ 0 ° $\theta =$ 0 ° $A =$ 0.741 cm (in)

$Z = A \sin \gamma =$ 0.000 cm (in) Where Z is <0.32 cm ($<1/8$ in)

$W = A \sin \theta =$ 0.000 cm (in) Where W is <0.08 cm ($<1/32$ in)

$P_a =$ 0.371 cm, in $P_b =$ 0.371 cm, in

$P = P_a + P_b / =$ 0.371 cm, in

$D_t =$ 0.250 cm, in $P/D_t =$ 1.482 Where $P / D_t \geq 1.05$ and ≤ 1.50

Comments: Client: Badger Labs

Type of Probe and Effective 3' Replacement Pitot

$C_p =$ 0.84

Pyrometer Calibration Sheet

Reference Calibrator

Extech Digital Thermocouple Calibrator & Thermocouple, Model 42312

Certificate of Calibration # 1000290712

Instrument # 183309

Serial # 55000093

Calibration Procedure: 33K5-4-15-1: Thermocouple Simulator Calibrator

Calibrated by: Davis Inotek Calibration Lab

Instrument has been calibrated against standards traceable to NIST

Pyrometer Calibrated: Mill5 M5 Console

Date Calibrated: 2/23/2009

Calibrated by: bfl

Temperature Scale Used	Fahrenheit x Celsius	Full test x	Post test
------------------------	-------------------------	----------------	-----------

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
0°F	0 °F
50°F	50 °F
100°F	100 °F
150°F	150 °F
200°F	200 °F
250°F	250 °F
300°F	300 °F
400°F	400 °F
500°F	500 °F
600°F	599 °F
700°F	700 °F
800°F	800 °F
900°F	901 °F
1000°F	1001 °F
1250°F	1252 °F
1500°F	1502 °F
1750°F	NA °F
1995°F	NA °F

**METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS**

Meter Console Information		Calibration Conditions				Factors/Conversions		
Date	Time	02/23/09		8:30	°R			
Console Model Number	Mill 5	Barometric Pressure		29.35	in Hg		in Hg	
Console Serial Number	2023	Theoretical Critical Vacuum ¹		13.9	in Hg		in Hg	
DGM Model Number	S275	Calibration Technician		BFL				
DGM Serial Number	1							

¹For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

The Critical Orifice Coefficient, K, must be entered in English units, ($\text{ft}^{1.5} \text{°R}^{-0.5}$)/(in.³Hg min).

Calibration Data							
Metering Console				Critical Orifice			
Run Time	DGM Orifice ΔH (P_{av})	Volume Initial (V_{in})	Volume Final (V_{in})	Outlet Temp Initial (t_{in})	Outlet Temp Final (t_{in})	Serial Number	Coefficient K
Elapsed (\ominus) min	DGM Orifice ΔH (P_{av}) in H ₂ O	Volume Initial (V_{in}) cubic feet	Volume Final (V_{in}) cubic feet	Outlet Temp Initial (t_{in}) °F	Outlet Temp Final (t_{in}) °F		see above2
5.0	3.60	687.101	692.601	70	71	31	0.8550
6.0	2.15	662.601	697.729	71	72	23	0.6580
8.0	1.40	697.729	703.304	72	73	19	0.5310
9.0	1.00	703.304	708.558	73	74	16	0.4440
13.0	0.53	708.558	713.985	74	75	11	0.3160

Results

Standardized Data		Dry Gas Meter		Dry Gas Meter			
Dry Gas Meter (V_{in})	Critical Orifice ($Q_{crit,ext}$)	Critical Orifice ($Q_{in,ext}$)	Calibration Factor (Y)	Value (Y)	Variation (ΔY)	Flowrate Std & Corr ($Q_{in,ext,corr}$)	$\Delta H @$ ($\Delta H @$) in H ₂ O
cubic feet	cubic feet	cubic feet	cm	cm	cm	cm	in H ₂ O
5.418	1.084	5.430	1.086	1.0021	0.0078	1.086	1.708
5.026	0.838	5.014	0.836	0.9976	0.0032	0.836	1.708
5.447	0.681	5.395	0.674	0.9906	-0.0038	0.674	1.698
5.116	0.568	5.073	0.564	0.9916	-0.0028	0.564	1.730
5.266	0.405	5.213	0.401	0.9899	-0.0045	0.401	1.803
				0.9944	Y Average		0.073
						1.729	$\Delta H @$ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using Critical Orifices as Calibration Standards. The Critical Orifice Set Number 1409S was calibrated in accordance with CFR 40, Appendix A, Method 5, Section 7.2 by Millennium Instruments Inc. on 01/24/07.

Signature Bruce Lamers

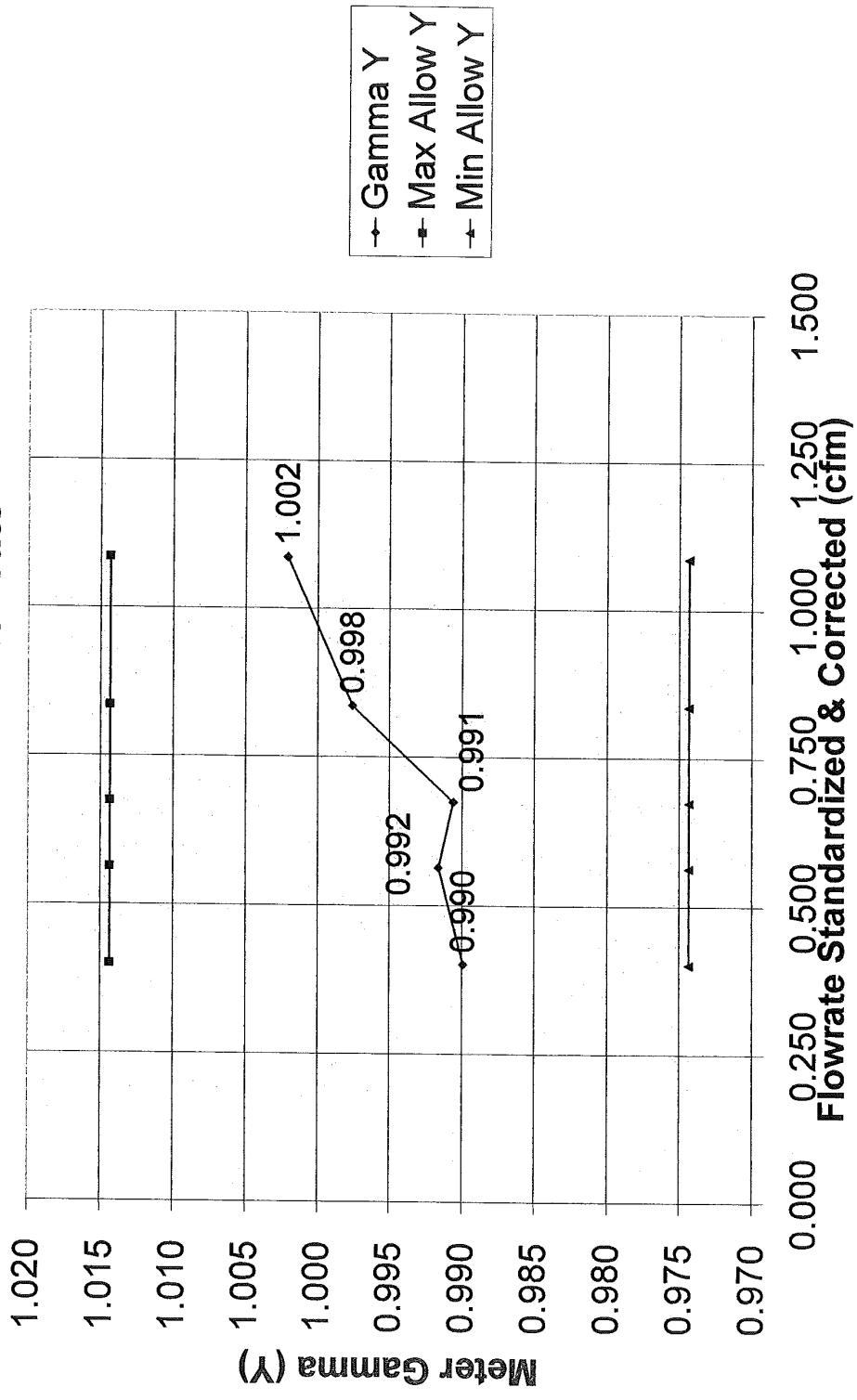
Date

2/23/2009

Calibration Date: 2-23-2009

Calibration Technician: BFL

Meter Gamma vs Flowrate

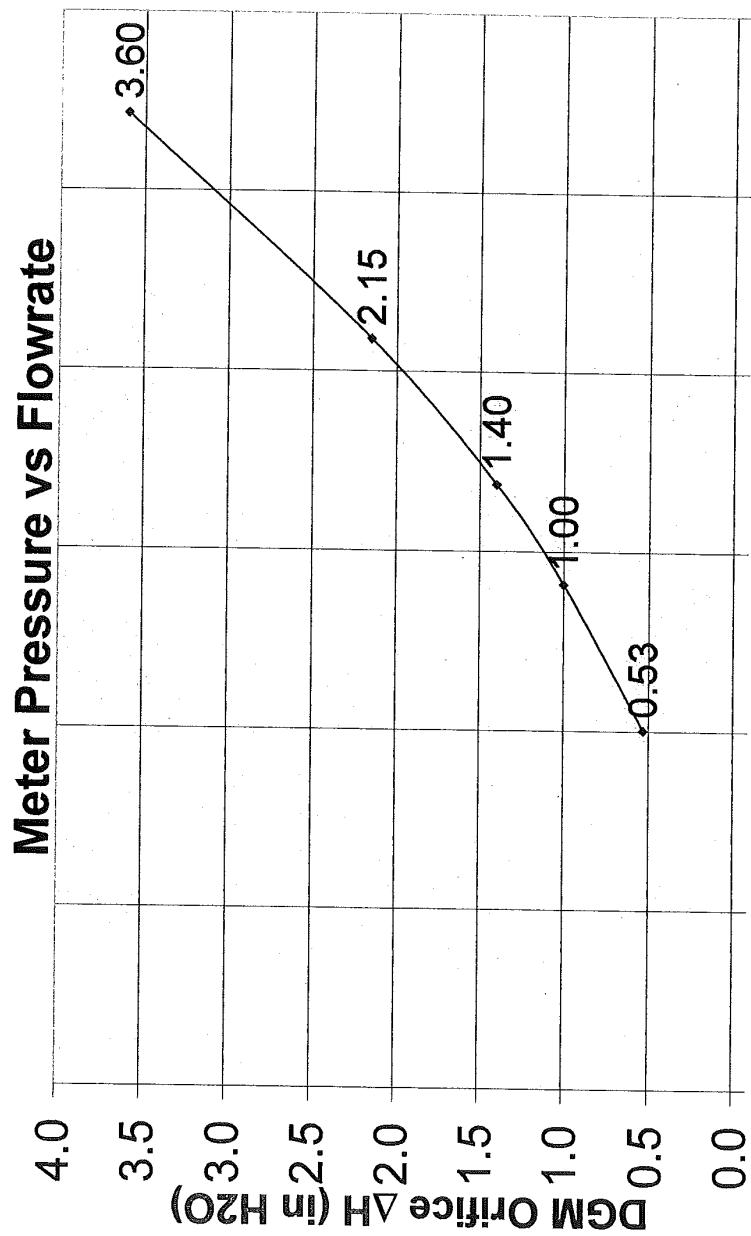


Console Serial: 2023

Console Model: Mill 5

Calibration Date: 2-23-2009

Calibration Technician: BFL



Mill 5

Console Model:

2023

Console Serial:

January 30, 2009

Mike Ross
Wisconsin Department of Natural Resources
La Crosse Service Center
3550 Mormon Coulee Road
Room 104
La Crosse, WI 54601

Dear Mr. Ross:

The following data is submitted regarding the source test plan of sampling for Particulate, Volatile Organic Compounds (VOC) and Phenol emissions to be followed at Atlas Resin Proppants. The facility is located north of Taylor, WI, off County Road P in Jackson County. The testing is being performed to demonstrate compliance with Wisconsin Department of Natural Resources (WDNR) Air Pollution Control Construction Permit No. 07-JAJ-042 limitations for Particulate, VOC and Phenol emissions on the Sand Resin Coating process (P151). Testing for Particulate emissions will be performed on the discharge of two separate baghouses (S20 and S120). The testing is scheduled for 9:00-10:00 A.M. on March 17-19, 2009. The Atlas Resin Proppants contact is Mr. Robbie Sage (phone #715-662-2200).

The emissions test will be run by Mr. Bruce Lamers who has more than fifteen years experience in stack emission testing.

Applicable methods for Particulate testing are EPA Methods 5 and 202. The sampling equipment for the Particulate testing consists of a Millennium Instruments Mill-5 stack sampler. A schematic of the sampling train is included as Figure 5. A Hayes Orsat Analyzer will be used for determining the gas stream molecular weight.

The sampling and analysis for VOC will follow EPA Method 25A. The testing will be performed concurrent with the Particulate emission tests. A heated Teflon line will be used to transport the sample from the sampling point to the analyzer. A VIG Model 20/2 total hydrocarbon analyzer, with a heated detector, will be used for VOC analysis. The analyzer will be calibrated with zero air and EPA Protocol propane calibration gases. Each test will be for a one hour long duration. A Dataq electronic data recorder will be used to provide a permanent record of the results and to log and average readings every five seconds.

The permit allows compliance determination for Phenol to be either a control efficiency of 64% for VOC emissions across the scrubber, or control efficiency of 54.5% for Phenol emissions across the scrubber. At this time it is not known if the scrubber can meet the 64% control for VOC emissions. We are planning on doing some preliminary testing to determine the VOC control efficiency. How the actual compliance determination for Phenol is performed, will be based on the preliminary testing. If Phenol testing is performed, it will follow NIOSH Method 2546 as recommended in the permit.

The emission test will consist of three repetitions of these methods. The arithmetic mean of the test results will be supplied as well as all raw data from each test run. The testing procedure is summarized as follows:

1. Determine sample points and initial velocity traverse.
2. Velocity, temperature and flow rate measurements.
3. Moisture and molecular weight determination.
4. Particulate, Phenol and VOC testing.
5. Sample recovery and Analysis.
6. Calculations and report.

Sand Resin Coating Process (P150)

The testing is to be performed on the discharge of a sand resin coating process (P151). Heated sand and flake resins, with a small amount of additives are mixed in the Batch Mixer. An aqueous hexamethylenetetramine solution is added to the Batch Mixer to cross-link the melted flake resin and begins cooling the coated sand. Each Batch Mix is 2,500 pounds. There are 11 batches per hour. During the emission test the process will be operated at this rate. Each batch is discharge into a Continuous Mixer (P152) which is designed to keep the process flowing as discrete particles until the product has cooled. The Continuous Mixer converts the batch process into a continuous process. There is a wet scrubber (C150) that is used to control emission from this source. The wet scrubber also controls emissions from (P153). During the stack test the premium product will be run to ensure the highest phenol and VOC readings that our plant sees.

The outlet sampling ports lie in a straight section of twenty inch diameter stack, more than eight diameters downstream and more than two diameters upstream of any flow disturbance. Sampling time will be determined after initial velocity measurements are made. A minimum sampling time of one hour will be used to obtain at least 30 cubic feet through the dry gas meter for the Particulate tests. Twelve points will be used for the Particulate sampling.

The inlet sampling location for the Phenol or VOC testing will be in a twenty-inch diameter duct. Sample port location will conform to EPA Method 1 specifications. The air flows will be determined according to EPA Methods 1-4.

The Particulate emission limitation for this source is 1.5 pounds per hour. The VOC limitation is 11.0 pounds per hour or 64% control efficiency across the scrubber. The Phenol limitation is either 64% VOC control efficiency or 54.5% Phenol control efficiency across the scrubber.

Tower A (old tower) (S20)

The testing is to be performed on the discharge of the baghouse (C20) at the stack (S20). The baghouse collects particulate matter in the form of silica and resin dust. It is collected from various points (P13, P16-17, P21-29, P41-49 & P71). The dust is generated while running a resin coated sand plant which processes approximately 11 batches per hour at 2,500 lbs. per batch.

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The outlet sampling ports lie in a straight section of twenty-eight inch diameter stack, 2.2 diameters downstream and 1.7 diameters upstream of any flow disturbance. Sampling time will be determined after initial velocity measurements are made. A minimum sampling time of one hour will be used to obtain at least 30 cubic feet through the dry gas meter for the Particulate tests. Twenty-four points will be used for the Particulate sampling. The Particulate emission limitation for this source is 1.0 pounds per hour.

Tower B (new tower) (S120)

The testing is to be performed on the discharge of the baghouse (C120) at the stack (S120). The baghouse collects particulate matter in the form of silica and resin dust. It is collected from various points (P113, P116-117, P121-129, P141-149 & P171). The dust is generated while running a resin coated sand plant which processes approximately 11 batches per hour at 2,500 lbs. per batch.

The outlet sampling ports lie in a straight section of twenty-eight inch diameter stack, 2.2 diameters downstream and 1.7 diameters upstream of any flow disturbance. Sampling time will be determined after initial velocity measurements are made. A minimum sampling time of one hour will be used to obtain at least 30 cubic feet through the dry gas meter for the Particulate tests. Twenty-four points will be used for the Particulate sampling. The Particulate emission limitation for this source is 1.0 pounds per hour.

Process data required during the testing will be collected by Atlas Resin Proppants personnel. The process data will include number of batches, pressure drop across the wet scrubber, liquor flow rate to scrubber and pH of wet scrubber absorbing fluid.

Please call me at 920-729-1100 or 800-776-7196 if you have any questions.

Very truly yours,

BADGER LABORATORIES & ENGINEERING
WDNR Certified Lab No. 445023150

Bruce F. Lamers
Project Manager

cc: Mr. Robbie Sage
 Atlas Resin Proppants

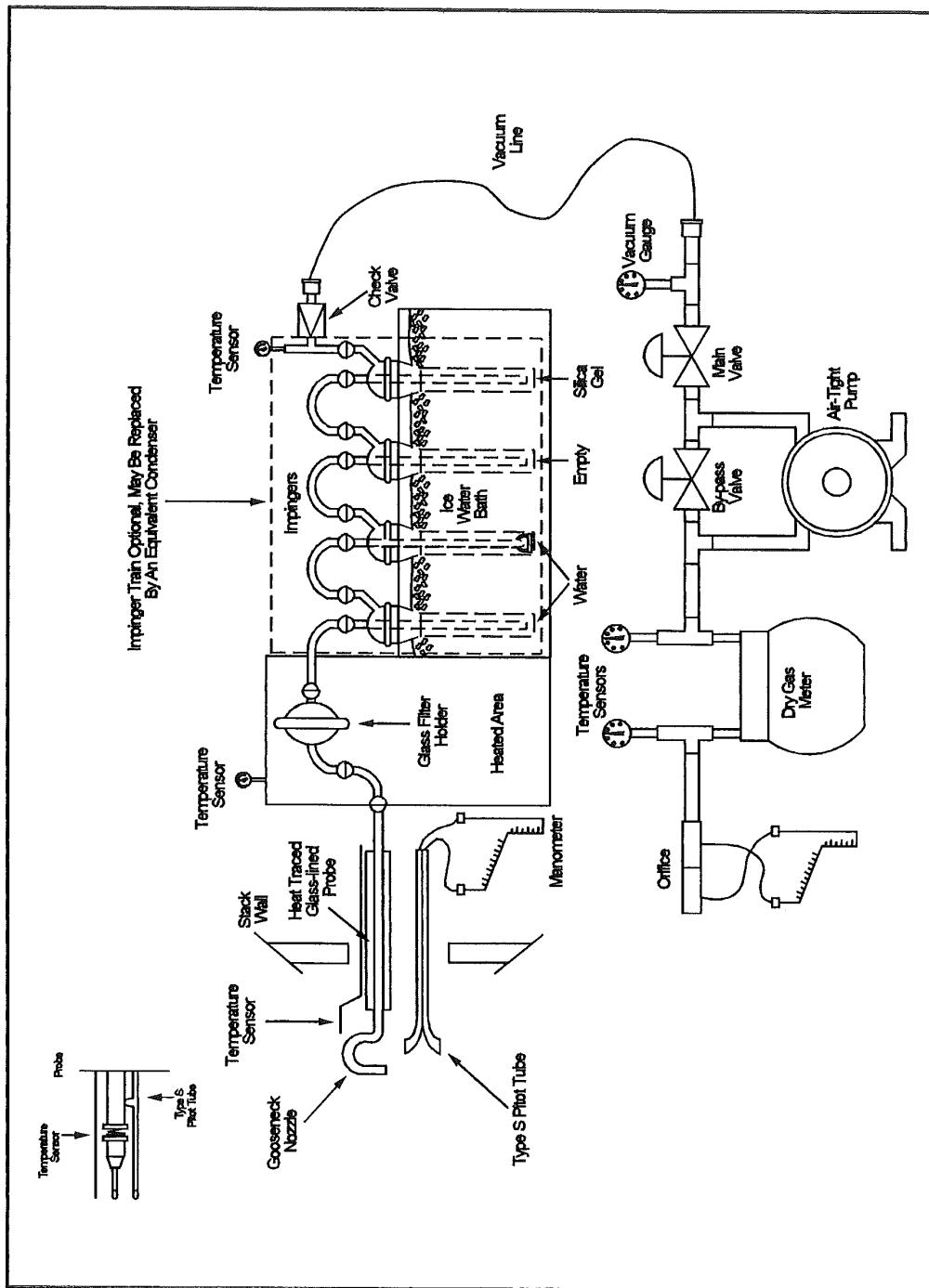
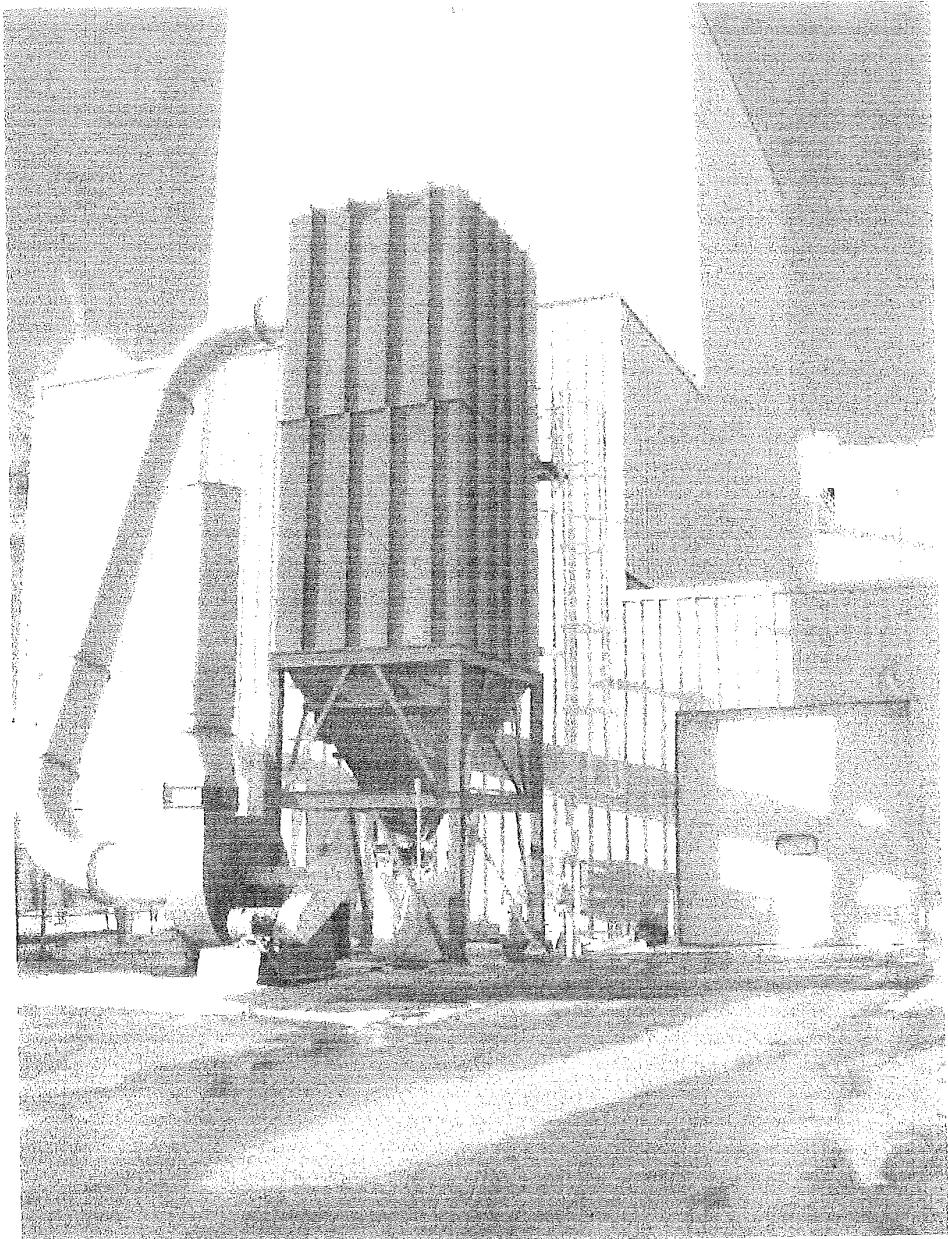
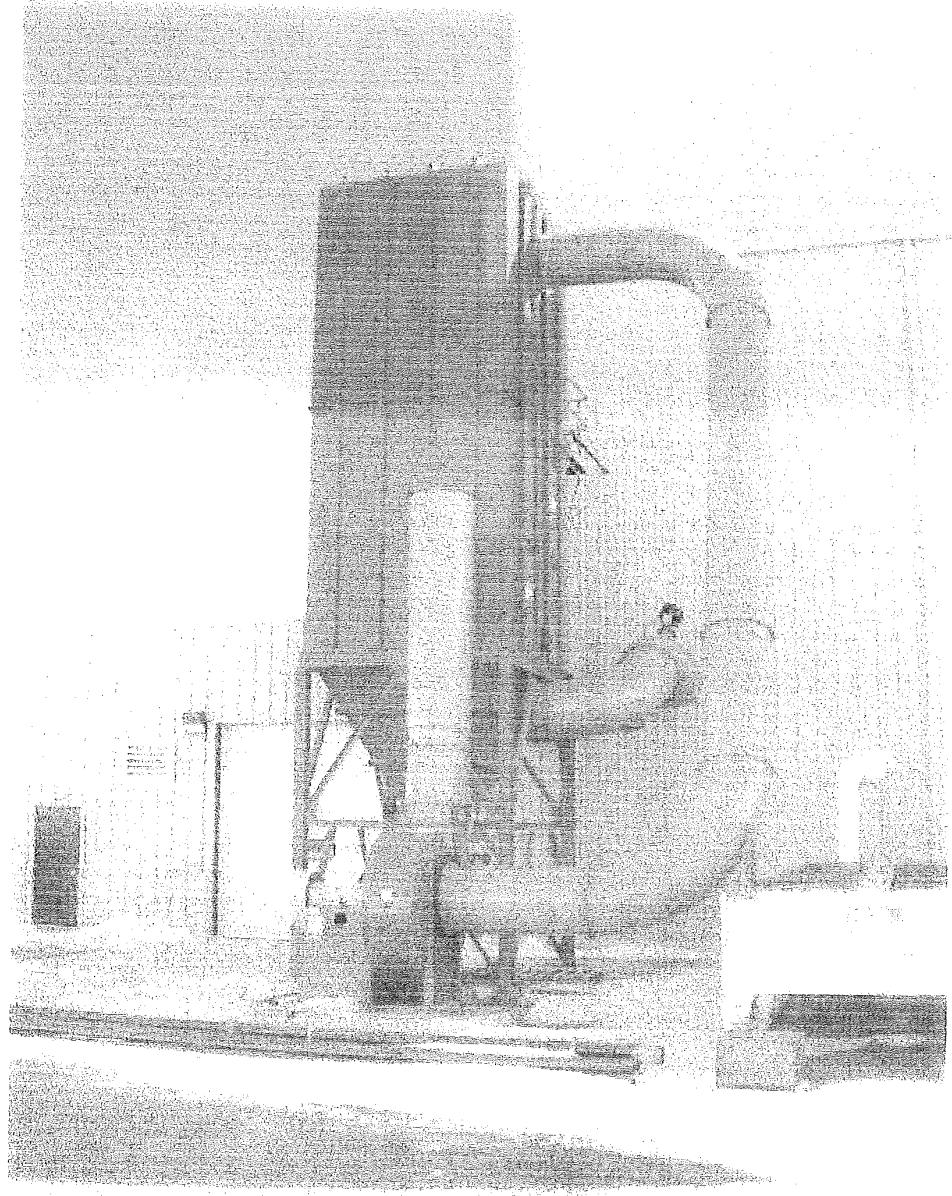


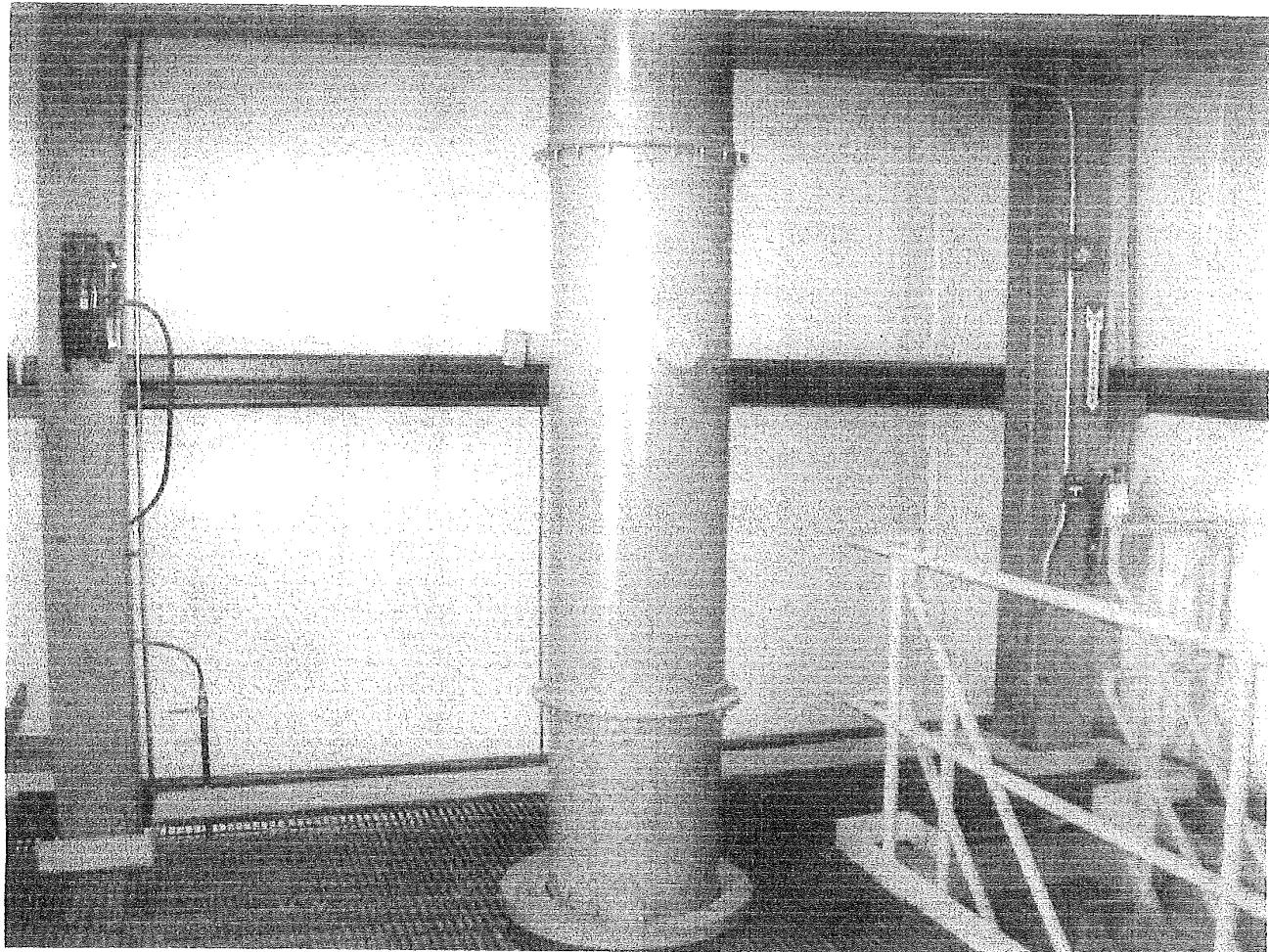
Figure 5-1. Particulate Sampling Train.



3 110



S. P. C.



Environmental Controls Inspection

Date	Time	Initials	Wet Scrubber		Demister		Venturi		Scrubber		Sludge Tank		Baghouse	
			Scrubber	Ap "wc	Ap "wc	pH	Flow gpm	Flow gpm	Chains	NTU's	Ap "wc	1-8" WC	Drum	Rotary
Spec Limits: 10-30" WC														
07/2 10:00	QF	1/4	.13		9.89	58	>45	>45	OK	<550	566	5	OK	OK
07/2 18:00	NP	13	.02	10.04	60	69	OK	OK	OK	87.6	5	OK	OK	OK
07/5 02:00	SR	13.25	.40	9.94	63	69	OK	OK	OK	45.5	4.5	OK	OK	OK
07/5 10:30	TZ	13	.40	9.88	66	70	OK	OK	OK	56.0	5	OK	OK	OK
07/5 18:00	NP	13	.20	9.96	68	69	OK	OK	OK	55.9	4	OK	OK	OK
07/6 02:00	NB	13	.40	9.92	68	70	OK	OK	OK	84.1	4	OK	OK	OK
07/6 10:00	MN	13	.35	10.09	66	70	OK	OK	OK	35.3	5	OK	OK	OK
07/6 18:00	NP	13	.30	10.04	68	69	OK	OK	OK	58	5	OK	OK	OK
07/7 02:00	JM	13.5	.02	9.99	65	70	OK	OK	OK	68.7	5	OK	OK	OK
07/7 10:00	TZ	12	.30	9.97	65	71	OK	OK	OK	51.3	5	OK	OK	OK
07/7 18:00	NP	12	.30	10.01	68	69	OK	OK	OK	68	4	OK	OK	OK
07/8 02:00	NS	13	.40	9.94	65	72	OK	OK	OK	58.5	4	OK	OK	OK
07/8 9:15	RB	13	.95	10.09	67	70				59.5				
07/8 9:45	RB	13	.20	10.04	67	72	OK	OK	OK	61.7	4	OK	OK	OK
07/8 10:15	RB	13	.30	9.99	68	72								
07/8 10:45	RB	13	.45	10.03	68	72								
07/8 11:15	RB	13	.60	10.02	68	72								
07/8 11:45	RB	13	.25	10.04	68	72								
07/8 12:15	RB	12	.20	9.95	69	72				28.9				
07/8 12:45	RB	12	.50	10.00	68	72								
07/8 13:15	RB	12	.25	9.99	67	72								
07/8 13:45	EH	12	.50	10.02	64	72	OK	OK	OK	54.3	4	OK	OK	OK
07/8 02:00	JM	13	.40	10.01	71	73	OK	OK	OK	58.4	4	OK	OK	OK

